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JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXXIII PART FIVE

May 1958

THE SECRETARY'S PAGE

ANNOUNCEMENTS—MAY AND JUNE

Shows

TUESDAY, May 20 to FRIDAY, May 23	Chelsea Show.

For details see pp. 187–190.

TUESDAY, June 3 12 NOON to 6 P.M.	Fortnightly Flower Show, Cactus and Succulent Society's Competition and Geranium Society's Competition, in the New Hall.
WEDNESDAY, June 4 10 A.M. to 5 P.M.	British Iris Society's Show, in the Old Hall.
TUESDAY, June 17 12 NOON to 6 P.M	Fortnightly Flower Show, Flowering Tree and Shrub Competition, Cactus and Succulent Competition for Amateurs (Sherman Hoyt Trophy) and British National Carnation Society's Competition, in the New Hall.
WEDNESDAY, June 18 10 A.M. to 5 P.M.	
FRIDAY, June 27 11 A.M. to 7 P.M.	National Rose Society's Show. (Both Halls on June 27; New Hall only on June 28.)
SATURDAY, June 28 10 A.M. to 5 P.M.	

Lectures

TUESDAY, June 3, at 3 P.M. "Propagation by cuttings; recent Research and its application", by MR. R. J. GARNER, M.SC., N.D.H.

TUESDAY, June 17, at 3 P.M. "Climbers and other Plants for Walls", by MR. G. H. PRESTON, F.L.S.

Demonstration at Wisley—The following demonstration will be given at Wisley, that on the second day being a repetition of that given on the first.

May 14–15. Summer Pruning of Shrubs. (Commencing at 2 P.M.)

Lily Group Meeting—The Lily Group will hold its second meeting of the year in the Restaurant of the Old Hall at 4.30 P.M. on Tuesday, June 17, when there will be a discussion on "Lilies in Pots".

Scottish Rock Garden Club's Show—The Scottish Rock Garden Club's Show will be held in The McLellan Galleries, 270 Sauchiehall Street, Glasgow, on Tuesday and Wednesday, May 13 and 14. The Joint Rock-garden Plant Committee will meet at the Show on Tuesday, May 13, and plants intended for the Committee's consideration should be entered with the Secretary of the Committee by 11 A.M.

Gardeners' Sunday—On the last Sunday in June many gardens all over the country will again be open to the public in aid of the Gardeners' Royal Benevolent Institution and the Royal Gardeners' Orphan Fund. This comparatively new scheme was unfortunate last year because the day was wet, and the joint committee earnestly hopes that the result for the third year will greatly exceed that of the first two.

The Gardeners' Royal Benevolent Institution urgently needs funds to maintain and endow its residential country home for old gardeners and their wives and widows, as well as for its work of providing pensions and grants for retired gardeners living in distressed circumstances in their own homes.

The Royal Gardeners' Orphan Fund has recently raised the amount of the allowance provided for the fatherless children of gardeners, but the Fund's assured income is insufficient to meet the increase.

Fellows who are prepared to open their gardens on "Gardeners' Sunday"—the last Sunday in June—are invited to communicate with the Secretary, "Gardeners' Sunday", 92 Victoria Street, London, S.W.1. It is also hoped that many Fellows and their friends will support the gardening charities by making a point of visiting gardens which are opened under the scheme. A booklet giving particulars of such gardens may be obtained from the above-mentioned address, price 8*d*., post free.

Tour of Irish Gardens in 1959—A tour of National Trust Gardens in Ireland, including Rowallane and Mount Stewart as well as a number of well-known gardens around Dublin, is planned for May, 1959. For particulars application should be made to either Lt.-Cmdr. (S) H. F. White, M.B.E., The National Trust, 42 Castle Street, Belfast, or Mr. Peter Lubbock, 60 Ebury Street, London, S.W.1.

Registered Daffodil Names—At the request of the Fourteenth International Horticultural Congress the Society has become the International Registration Authority for Daffodil Names, and in that capacity has published *The Classified List and International Register of Daffodil Names*. This book, which should be used by all who raise, name or

exhibit daffodils, may be obtained from the Society's offices, price 6*s.*; by post 6*s.* 9*d.*

Code of Nomenclature—A new edition of the *International Code for the Nomenclature of Cultivated Plants*, as formulated and adopted by the International Commission for the Nomenclature of Cultivated Plants, December, 1957, may be obtained from the Society's offices, price 2*s.* 6*d.*, post free.

ARRANGEMENTS FOR CHELSEA SHOW, 1958

Chelsea Show will, as usual, be held in the grounds of the Royal Hospital, Chelsea, London, S.W.3.

Private View – There will be a Private View on Tuesday, May 20, from 8.30 A.M. to 8 P.M., open only to Fellows and Associates on surrender of the special *detachable* parts of their annual tickets. For details please refer to the paragraph relating to Fellows', Overseas Fellows' and Associates' tickets.

In no circumstances, by payment or otherwise, can extra admissions to the Private View be allowed.

Dates of Show – The Show will be held on Wednesday, Thursday and Friday, May 21, 22 and 23.

Times – Fellows and Associates

Fellows, Associates, and those presenting Fellows' Transferable Tickets are admitted free of charge during the following periods:

Wednesday, May 21	8.30 A.M. to 8 P.M.
Thursday, May 22	8.30 A.M. to 8 P.M.
Friday, May 23	8.30 A.M. to 5 P.M.

The Public

The Charges for admission are:

Wednesday, May 21	8.30 A.M. to 8 P.M.	– £1
Thursday, May 22	8.30 A.M. to 8 P.M.	– 10*s.*
Friday, May 23	8.30 A.M. to 12 NOON	– 5*s.*
	12 NOON to 5 P.M.	– 2*s.* 6*d.*

In no circumstances can admission be gained at any time on Tuesday, May 20.

Admission of Children – Children under five years of age cannot be admitted. The charge for the admission of children of five years and over will be the same as for adults.

Parties – No reduction in the price of admission can be made for parties of visitors, but tickets may be obtained beforehand to save trouble on arrival. Application, accompanied by a remittance to cover the cost of the tickets required, should be made to the Secretary, The Royal Horticultural Society, Vincent Square, London, S.W.1, early in May. Such applications *must* reach the Secretary not later than the first post on Friday, May 16.

Fellows', Overseas Fellows' and Associates' Tickets – A Fellow subscribing 4 guineas annually receives 1 non-transferable and 5 transferable tickets. The non-transferable ticket has two *detachable* parts which will admit the Fellow and one other person to the Private View on May 20.

A Fellow subscribing 3 guineas annually receives 1 non-transferable and 2 transferable tickets. The non-transferable ticket has two *detachable* parts which will admit the Fellow and one other person to the Private View on May 20.

A Fellow subscribing 2 guineas annually receives 1 transferable ticket. This ticket has a *detachable* part which will admit only the Fellow to the Private View on May 20.

An Overseas Fellow when on a visit to the United Kingdom can obtain, on application to the Secretary at the Society's Office in Vincent Square, London, S.W.1, a non-transferable ticket which has a *detachable* part which will admit only the Overseas Fellow to the Private View on May 20.

An Associate receives 1 non-transferable ticket. This ticket has a *detachable* part which will admit the Associate to the Private View on May 20.

Each Fellow's ticket (including an Overseas Fellow's ticket) whether non-transferable or transferable, will admit one person at any time when the Show is open on Wednesday, Thursday, and Friday, May 21, 22 and 23, but the non-transferable ticket may, of course, be used only by the Fellow to whom it is issued. An Associate's ticket may be used only by the Associate to whom it is issued.

Transferable tickets may not be left at the turnstiles for collection by persons visiting the Show later, but may be posted at the Post Office in Main Avenue.

Affiliated Societies – The annual tickets issued to affiliated societies do not admit to Chelsea Show. Six special tickets will be sent to the secretary of each affiliated society, early in May. Two of these will be valid on May 21, or May 22 or May 23, and four will be valid on either May 22 or May 23.

Catering – It is regretted that it is not possible to provide set luncheons and teas, but buffets for the service of light refreshments will be available. There will also be separate enclosures for the service of alcoholic beverages.

Post Office & Telephones – A Post Office for the transaction of ordinary Post Office business will be found in Main Avenue, as will also several Public Telephone Boxes.

Railway Inquiries – British Railways have an inquiry bureau in the Show, situated at the junction of Main Avenue and Main-way.

Band – The Band of H.M. Grenadier Guards will, by courtesy of the Officer Commanding, play each afternoon in the Ranelagh Gardens, where chairs are provided.

Cloakroom – A cloakroom at which bags, parcels, etc., may be deposited will be situated in Main Avenue.

Catalogue – An official Catalogue and Guide to the Show will be on sale in the Grounds, price 1*s*. 6*d*.

Bath Chairs – The arrangements for the admission of Bath chairs will be as follows:

On Tuesday, May 20, Fellows and Associates in Bath chairs will be admitted between 8.30 A.M. and 8 P.M. on presentation of tickets for the Private View. There will be a charge of 5*s*. for each chair, and that charge will cover one attendant.

On Wednesday, May 21, Bath chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment

of £1 for the occupant of the chair. There will also be a charge of 5*s*. for the chair and that charge will cover one attendant.

On Thursday, May 22, Bath chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment of 10*s*. for the occupant of the chair. There will also be a charge of 5*s*. for the chair, and that charge will cover one attendant.

On Friday, May 23, Bath chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment of 5*s*. for the occupant of the chair. There will also be a charge of 5*s*. for the chair, and that charge will cover one attendant.

The Society cannot arrange for the provision of Bath chairs, but they may be hired from Messrs. Reselco Invalid Carriages Ltd., 262 King Street, London, W.6. Chair attendants cannot be supplied.

TRANSPORT

Visitors travelling by car, taxi or coach should alight at the Embankment entrance. Visitors travelling to London will find the following Railway and Bus Services of London Transport operating from the Main Line Termini:

CANNON STREET (*Railway*). District Line direct to Sloane Square. (*Bus*) Number 13 to Charing Cross, thence by Number 11 to Lower Sloane Street, Pimlico Road.

CHARING CROSS (*Railway*). District Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

EUSTON (*Railway*). Northern Line to Charing Cross, thence by District Line to Sloane Square. (*Bus*) Number 68 or 188 to Strand (Aldwych), thence by Number 11 to Lower Sloane Street, Pimlico Road.

FENCHURCH STREET (*Railway*). Tower Hill direct to Sloane Square. (*Bus*) Number 10 to Victoria Street, thence by Number 11, 39 or 46 to Lower Sloane Street, Pimlico Road.

KING'S CROSS AND ST. PANCRAS (*Railway*). Piccadilly Line from King's Cross and St. Pancras to Leicester Square, thence by Northern Line to Charing Cross, thence by District Line to Sloane Square. Or Circle Line direct to Sloane Square. (*Bus*) Number 77 or 77A to Whitehall, thence by Number 11 or 39 to Lower Sloane Street, Pimlico Road.

LIVERPOOL STREET (*Railway*). By Circle Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

LONDON BRIDGE (*Railway*). Northern Line to Bank, thence by District Line from Monument to Sloane Square. (*Bus*) Number 10 to Victoria, thence by Number 11, 39 or 46 to Lower Sloane Street, Pimlico Road.

MARYLEBONE (*Railway*). Bakerloo Line to Paddington, thence by Circle Line to Sloane Square. (*Bus*) Number 2, 30 or 74 from Baker Street to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

PADDINGTON (*Railway*). Circle Line direct to Sloane Square. (*Bus*) Number 36 or 36A to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

VICTORIA (*Railway*). District Line direct to Sloane Square. (*Bus*) Number 11, 39 or 46 to Lower Sloane Street, Pimlico Road.

WATERLOO (*Railway*). Northern or Bakerloo Line to Charing Cross, thence by District Line to Sloane Square. (*Bus*) Number 46 to Lower Sloane Street, Pimlico Road.

BAKER STREET (*Railway*). Circle Line direct to Sloane Square. (*Bus*) Number 2, 30 or 74 to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

A plan giving approach routes to the Show and parking places may be obtained on application to the Secretary.

NOTES FROM WISLEY

WE are often asked, by those who can visit Wisley only infrequently, when is the best time to come. A visit made on a fine, bright day at any season can be a source of pleasure; but for quantity and variety of flowers the second half of May is probably unsurpassed in most years. The fresh young foliage opening on the deciduous trees and shrubs adds greatly to the beauty of the scene, while the song of the birds and the scent of newly-mown turf make a contribution to one's enjoyment.

The tulips on the terrace, of which a glimpse is obtained from the entrance gate, form one of the month's outstanding features. This is the third season in which tulips have been used alone, without underplanting, for the spring bedding, and this is an effective method provided the bulbs can be set closely together.

During the present month the hybrid rhododendrons reach the height of their beauty. This is the best time to make a selection for one's own garden, and anyone desirous of doing this should make a point of studying the rhododendron trial. This is one of the permanent trials carried on year after year, and consists of a standard collection of established varieties as well as new ones that have been selected for trial at Wisley after exhibition at one of the Society's London Shows before the Rhododendron and Camellia Committee. The majority have received the First Class Certificate or the Award of Merit and they are obtainable from nurseries. The trial enables an intending purchaser to judge the habit of growth, freedom and time of flowering, and colour. These could all be described as hardy, although in the event of a severe late spring frost some of the flowers may be spoilt and some injury may be sustained by the expanding young leaves.

Apart from the trial a great many other hybrids are to be seen on Battleston Hill. Some are under number, and these are seedlings, raised from crosses made at Wisley, whose true value has not yet been determined, although a proportion of them may have flowered. Some other Wisley hybrids are already recognized as fine garden plants. The 'Moonshine' group of seedlings, for example, which came from crosses between 'Adriaan Koster' and *R. litiense*, are the result of deliberate

attempts to produce hardy plants of good habit with well-flowered trusses of bright yellow flowers. The best of the Wisley hybrids will be distributed to the trade when they have been propagated in sufficient quantity, but some years must necessarily elapse before they become generally available.

The removal of faded flowers from the rhododendrons is a very laborious, but rewarding, task. If it is done promptly, the food materials which would have been used in the production of seed-vessels will be directed to the new growths arising near the base of the flower-truss, and enable them to form flower-buds for the next season.

The section on the west side of the broad walk, opposite the rhododendron trials, is devoted to what are described as Japanese and evergreen azaleas. These are generally rather small, densely branched, compact bushes which literally cover themselves with flowers in a range of colour from white through pink and salmon to crimson and orange. To place them correctly in botanical categories would be a task of the greatest difficulty, as the parentage of many of them must be a matter of conjecture; but it will suffice to say that most are forms or hybrids of *Rhododendron obtusum* or of the closely-related *R. kaempferi* or *R. kiusianum*. To the last named (otherwise called *R. obtusum* var. *japonicum*) belong the Kurume Azaleas. Many variants of that species were discovered in 1918 by E. H. WILSON, a distinguished plant-collector, growing in nursery gardens in the neighbourhood of Kurume, in the Island of Kiushiu in south-west Japan. He made a selection of fifty kinds and sent plants of these to the Arnold Arboretum in 1919. The exciting story of the discovery is told by WILSON in *A Monograph of Azaleas* (Publications of the Arnold Arboretum, No. 9, 1921).

Through the generosity of the late MR. J. B. STEVENSON of Tower Court and MR. CHARLES WILLIAMS of Caerhays, who gave us cuttings in 1946, Wisley was enabled to establish a collection of all the original "Wilson Fifty". These are now large bushes, completely covering the ground, requiring practically no attention other than watering in very dry spells, and flowering with astonishing freedom.

Among other attractions on Battleston Hill will be the magnolias, including *M. wilsonii* and *M. sinensis*, both with broadly cup-shaped, pendent blooms of purest white, *Davidia involucrata*, the Handkerchief Tree, in which the ball of inconspicuous flowers is enclosed within a pair of large white, crinkled bracts, and *Halesia monticola*, a superior Snowdrop Tree, with large bell-shaped flowers hanging in clusters of four or five. This is an upright growing species showing a stronger tendency to adopt the tree form than the more familiar *H. carolina*.

There are other trees of interest on Weather Hill, where the late cherries are still gay. One of the latest, 'Shirofugen', is a broad-headed tree of great charm and individuality. Its flower-buds, before opening, are suspended four or five together, like bronze-pink beads, on long peduncles; the full, frilly flowers open pale pink, fade to white and finish deep pink again as they age. Meanwhile, the foliage leaves expand pale,

copper-tinted blades. Contrasting strongly there is *Prunus cerasus* var. *rhexii*, a form of the Sour Cherry which has green leaves and bunches of regular, very double white blossoms sprinkled over its thin branchlets.

Also on Weather Hill there is a young tree of Adam's Laburnum (*Laburnocytisus adamii*), with flowers of a brownish-pink colour. The history of this botanical curiosity may be unknown to some readers. In 1829 a Parisian gardener named Adam grafted on a stem of common laburnum a scion of the dwarf purple broom *Cytisus purpureus*, in order to make a standard specimen. Actually he achieved a much more surprising result. From the point of union arose a shoot bearing leaves and flowers intermediate in form and colour between those of the stock and scion. The true nature of this growth was not at once understood; and many years elapsed before it was shown to be compounded of tissues of both stock and scion; the laburnum supplying the underlying substance and the purple broom the surface layers. It is an example of what is called a graft chimaera.

In the lime-free soil of the wild garden ericaceous shrubs give a good account of themselves. One of the less common but very decorative genera is *Enkianthus*, of which about ten species, distributed in nature from the Himalaya to Japan, have been described. From their tendency to produce whorled branchlets at the tips of upright stems they develop an attractive habit of growth. In May each apical bud puts forth a cluster of pale, obovate or oblanceolate leaves and a spray or bunch of drooping bell-shaped or globose flowers. In *E. perulatus* the pearl-like blossoms come first, and for a brief space in early autumn this is one of the most brightly-coloured shrubs. *E. campanulatus*, which is capable of growing to 20 feet or more, has comparatively large flowers of pale yellow or whitish, more or less heavily striped with red, and exhibits several well-marked varieties regarded by some as distinct species. These, too, all colour well before leaf-fall. *E. cernuus* makes a smaller, white-flowered plant, and it has an outstanding red-flowered variety *rubens*, a most desirable plant.

Some other genera of the same family which are prominent at Wisley are *Kalmia*, *Menziesia* and *Zenobia*, all as notable for the beauty of the individual flower as for their massed effect. In an unfrequented part of the wild garden there is a bush of *Tripetaleia paniculata*, a small deciduous Japanese shrub not at all suggestive of Ericaceae. The flowers are arranged in narrow panicles at the tips of the current year's shoots, and each has three narrow, pinkish, recurved petals. *Cladothamnus pyroliflorus*, the solitary species of a western North-American genus, growing nearby, makes a rather upright bush not over 5 feet high at present, with narrow, entire leaves and saucer-shaped, five-petalled flowers of a peculiar yellowish-pink tint.

Gaultheria shallon and *Pernettya mucronata* have long been established in the wild garden, and nearly thirty years ago the first flowers appeared on a hybrid between the two which had arisen there spontaneously. This forms a compact evergreen plant in many respects

intermediate between its parents, with neat foliage and numerous axillary panicles, clustered near the stem-tips, of pearly white flowers succeeded by dark, reddish-purple berries. It is properly known as *Gaulthettya wisleyensis*, although it has been distributed by seed and otherwise under the name *Gaulnettya* 'Wisley Pearl'. It is of interest to note that natural hybrids between species of these two genera have been recorded both in New Zealand and in Mexico.

In the parts of the Gardens not already noticed there will be plenty of seasonable flowers: lilacs, spiraeas, dogwoods and the earliest rose species in Seven Acres and Howard's Field; saxifrages, primulas, lewisias, geums and many others in the rock gardens and alpine house; while in the larger greenhouses there will be as usual an extensive range of flowering and foliage plants.

RING CULTURE

Frank W. Allerton, B.Sc. (Hort.), A.R.I.C.

(*Lecture given on March* 4, 1958, MR. F. A. SECRETT, C.B.E., F.L.S., V.M.H., *in the Chair*)

As with so many scientific discoveries whose subsequent practical importance has been great, the conception of ring culture was accidental.

In 1946 at the F. W. Berk Tilgate Research Station, Crawley, Sussex, a programme of work was on hand to investigate the influence of nutrition on the blotchy ripening of tomatoes. One of the experiments involved the use of heavy glazed earthenware cylinders, known in the sulphuric acid industry as Raschig rings, as containers for a standard potting compost.

It so happened that part of the tiled floor of the glasshouse concerned in this experiment had at some previous time been covered by a layer of boiler ash and, in consequence, some of the rings were standing direct on the tiles and some on the ash bed.

Despite the fact that all the rings were identically treated in regard to water and nutrients, it soon became apparent that the plants in the rings standing on the ash were much superior to those on the tiles. When the cropping results were analysed at the end of the season two significant facts came to light. In the first place, blotchy ripening was much less severe with those plants on the ash base, and furthermore, that these plants produced an average weight of fruit of 24·4 lb. as compared with 13·1 lb. average from the plants on the tile base.

This apparently mysterious circumstance was explained when, on removing the rings from the house at the end of the season, it was found that the plants overlying the ash had produced a massive secondary root system in that continuously moist layer.

This discovery was obviously of fundamental importance and the method of growing in bottomless containers overlying an inert layer was originally given the name of "The Two-Zone Root system". Later the equally descriptive and more convenient term "Ring Culture" was adopted.

For several years little extension work was done on this system, but in 1951 a programme of research was put in hand which terminated in the establishment of the principles of ring culture as we know it today.

The first investigation concerned the size of ring or, in other words, the volume of compost, necessary for maximum crop production. Raschig rings holding 24 lb. of compost were compared with bottomless cement pots holding from 17 lb. down to 2 lb. of compost. The compost, feeding and general culture was identical in all cases and the results were recorded by growth measurements, average crop in each plot, and fruit quality.

This experiment, repeated with virtually identical results during the following season, demonstrated that there was nothing to be gained by having more than about 14 lb. of compost. Rings of this capacity and larger gave average crop weights of 18 lb. of ripe fruit, but it is noteworthy that even the 5-inch-diameter pots holding only 2 lb. of compost produced just over 10 lb. of fruit per plant!

Further work made it apparent that any type of bottomless container presenting a substantial area of contact with the underlying or "aggregate" layer and holding about 14 lb. of standard compost would serve the desired purpose and it remained only to standardize upon the most convenient form of ring.

Clay and cement rings, otherwise completely suitable, were discarded on the grounds of weight, fragility and the necessity for laborious handling and cleaning between each crop. Metal rings seemed unduly expensive as, indeed, were any type of permanent nature. The answer was found in the 9-inch-diameter rings of flexible composition which, in the more familiar form with bottoms, were already in considerable use on commercial nurseries for container culture of tomatoes.

Such rings, freely available to both commercial and amateur growers, are today standard for ring culture of tomatoes.

Parallel to the investigations on ring size, were trials designed to determine the best type and depth of base material or aggregate.

The experiments, extending over several seasons, covered boiler ash, crushed clinker, various grades of gravel and several types of sand.

Most of these materials were found to be capable of supporting the secondary, water-absorbing root system but not all were convenient in practice. Coarse gravel and the larger grades of crushed clinker needed watering several times a day in hot weather and so were eliminated. Fine sands held plenty of water, but the roots were obviously limited by lack of aeration.

Washed, crushed shingle of $\frac{3}{16}$ inch grade proved acceptable, but all

the work led back to the original blotchy ripening trial involving boiler ash. Such ash, of grade 1 inch down to dust with the majority of particles of $\frac{1}{4}$ to $\frac{1}{8}$ inch size, was found to be ideal.

Boiler ash of this type has the advantage of being a waste material, highly absorbent of water, open and well aerated in texture and fairly readily available for little more than the cost of cartage. In no instance at Tilgate has trouble arisen due to root-inhibiting or directly toxic substances in the ash employed. This is probably due to the fact that the ash had in all cases been weathered out of doors for a year or more. With fresh ash I find that very thorough washing is required to make it suitable for use and I shall refer more fully to this point in connection with my own application of ring culture to amateur's conditions both in the greenhouse and out of doors.

As regards the optimum depth of the aggregate the Tilgate work showed that, whereas a layer as shallow as 3 inches often gave satisfactory results, there was a tendency for many of the roots to penetrate into the unhealthy soil beneath. A depth of 4–6 inches was found to be ideal; depths greater than 6 inches showed no advantage and involved undue cost in aggregate material and labour in handling.

Questions often asked at Tilgate concerned the advisability of isolating the aggregate layer from the soil beneath and of sterilizing the aggregate material between crops.

Trials showed no advantage under Tilgate soil conditions of introducing a layer of roofing felt, concrete or polythene sheeting over the surface of the excavated soil before filling in the aggregate. Indeed, free downward drainage for surplus water was found to be most desirable and the introduction of any impervious layer demanded carefully devised drainage to efficient sumps. Isolation of the aggregate is advised only where the soil of the house is known to be infected in depth with eelworm or with wilt diseases.

On the question of sterilizing the aggregate, it is interesting to record that the same ash has now been used in one house at Tilgate for seven seasons with no more cleansing between crops than that provided by formaldehyde solution falling on it when the superstructure of the house is washed down. Since, however, so little formaldehyde or tar distillate solution is required to saturate the open-textured aggregate, it is a sensible precaution to treat such cleansing as a routine operation when the house can be left vacant for several months.

The other routine cultural operations investigated at Tilgate were watering and feeding.

Watering was found to be a model of simplicity since, once the secondary roots were forming in the aggregate, frequent drenching of this layer satisfied virtually all the plants' water requirements between the weekly feeds with liquid fertilizer. This finding was explained by the fact that most of the water needed by the plants was supplied by the aggregate and the compost in the rings was kept substantially moist between feeds due to suction of water from the aggregate.

How great an advantage over normal pot culture where watering at least once a day is often needed in hot weather!

A certain amount of water does, of course, reach the compost when the aggregate is given the daily drench and when the plants are damped overhead to assist setting of the blooms. There is, however, no comparison between the critical task of watering pots at just the right time and the casual drenching of the aggregate roughly once a day at convenience.

Prior to the entry of roots into the aggregate, it was established that the normal routine of ball-watering applied no less to ring culture plants than to those in pots and, indeed, ring culture, as such, commences only when the secondary root system is developed.

A considerable programme of work was undertaken to determine the best feeding routine for tomatoes in ring culture.

At an early stage in these experiments it was shown that liquid feeds —feeds where all the nutrients were applied dissolved in water—gave results superior to standard solid tomato feeds. This conclusion was not unexpected since a considerable quantity of water, put down in several applications, is required to dissolve such feeds. In ring culture, virtually no water is applied to the rings between feeds so that the solids tended to accumulate on the surface of the ring compost rather than to become available to the feeding roots.

Many different balances of feed were tried over several seasons and it was found that optimum results in terms of crop weight and quality were obtained by using a liquid concentrate containing 6 per cent nitrogen, 6 per cent phosphoric acid, and 7 per cent potash together with magnesium. The standard ring culture feeding procedure today is to apply this feed at seven-day intervals giving each ring 2½ pints of a 1 in 100 dilution. This corresponds to 2 fluid ounces in 1½ gallons of water and feeding commences at the usual stage of swelling of the fruit on the first truss. It should be recorded that neither variations in season nor the growth characteristics of different tomato varieties appear to modify the validity of this feeding routine.

Feeding in ring culture is a simple routine with a standard fertilizer but one important point should be noted. The feeding solution is applied only to the rings and not to the aggregate layer. This might seem curious in view of the great amount of root growth which forms in the aggregate, but it should be appreciated that the aggregate root system is essentially concerned with supplying water and not with meeting the nutrient requirements. The application of feed to the aggregate would not only be wasteful, since the next drench with water would leach away the nutrients, but the presence of the dissolved fertilizer salts would hamper the uptake of water. For these reasons the weekly feeds are restricted entirely to the rings.

A further aspect of ring culture subject to trials at Tilgate was that of tomato varieties.

In 1954, fifteen varieties covering the full range of those best known commercially were critically compared. All did extremely well, pro-

ducing in the order of 18 lb. of fruit per plant and ring culture was confirmed as an ideal method of growing whether the variety is strong-rooting and vigorous such as 'Ailsa Craig' or weak-rooting and of limited vigour such as 'Baby Lea'.

In all cases the plants rapidly came into bearing and with normally efficient management produced exceptionally high-quality fruit, even in the case of that much-maligned variety 'Potentate'.

Blotchy ripening was not entirely absent in those varieties subject to this disorder, but the proportion of the fruits which had to be down-graded by reason of this blemish was at all times so low as to establish ring culture as an effective means of minimizing the unbalanced condition of growth which is known to predispose towards physiological disorders of the fruit.

Finally, in 1956, in recognition of the difficulties experienced by many growers in obtaining fresh maiden loam every year, a comparison was made between ring composts prepared from such loam and from previously used ring compost which had been sterilized and balanced nutritionally on the basis of a soil analysis. Both composts were brought up to J.I.P.3, as this was the ring compost on which all work at Tilgate had been based, and it was found that the 18·8 lb. average crop per plant from the maiden loam compost fell to only 17 lb. in the "second-soil" compost which prior to being standardized nutritionally had been flooded to remove soluble fertilizer residues and sterilized with formaldehyde.

It is apparent, therefore, that the lack of maiden loam need not detract materially from the crops obtained by ring culture providing due attention is paid to leaching and sterilizing of the "second-soil" and the John Innes principles for the physical ingredients are maintained.

The foregoing notes cover briefly the principles of ring culture which were determined over a period of years, with such painstaking care and attention to detail, by MR. HAROLD KINGSTON, the Superintendent of Tilgate Research Station, and his staff.

Now, it has been my privilege over the years to maintain the closest of contact with the Tilgate work and such have been my convictions regarding this method of growing that I have made every effort to extend the system from the confines of Tilgate to commercial and amateur growers throughout the country.

The commercial grower is essentially conservative in outlook, especially in respect of any change from the time-honoured methods in the actual growing of the crop, but gradually ring culture is gaining hold on nurseries both large and small.

The attraction of this system commercially is not only the high production and excellent fruit quality which this system of controlled growth permits, but also the very material saving in cost arising from the fact that the annual winter soil-steaming, common throughout the Industry, can be limited to the comparatively very small quantity of loam required for making up the ring compost.

However, my present concern is not with the market producer of tomatoes but with gardeners all over the country who look upon the tomato as an interesting and worthwhile plant to grow, whether it be in the greenhouse or out of doors.

So far as the greenhouse is concerned, the general principles already outlined for the glasshouses at Tilgate apply equally to the small house in the back garden.

Out of doors the extremely rapid, yet balanced, growth promoted by ring culture enables a substantial crop of ripe fruit to be grown in even poor summers and the illustrations show, beyond all doubt, what can be achieved against a boarded fence or a wall of southern aspect (Fig. 58).

The metal-framed greenhouse which I devote to tomatoes in ring culture once the propagating season has been completed is only 8 feet × 6 feet in size yet the twelve plants which can be accommodated invariably produce upward of 100 lb. of top-grade tomatoes between mid June and the end of September and many pounds of green fruit remain to be ripened artificially.

A similar number of plants against a south fence have produced from 5 to 7 lb. of ripe fruit per plant over the last three seasons with picking beginning in early to mid July.

It is apparent, therefore, that the Tilgate ring culture principles can be translated no less to garden conditions than to those of the large market grower.

It may be of value to those interested in adopting the ring culture method themselves to record the procedure which I, myself, have adopted over the last few years with complete satisfaction. So far as the aggregate layer is concerned the whole floor of the greenhouse is covered with a 5-inch depth of cinder ash accumulated from the household coal fires. The ashes, as obtained and while still dry, were passed through a 1-inch sieve to remove large pieces of stone, and other rubbish sold in these days as coal, and then through a sieve of $\frac{1}{8}$-inch mesh to remove the majority of the fine dust. This latter sieving is desirable since very fine ash tends to become pasty and poorly-aerated when drenching commences.

The cinder ash selected in grade by this sieving was weathered as far as possible through one winter and then, when *in situ* in the greenhouse, was watered heavily several times at intervals of a day to the extent of a total of roughly 10 gallons per square yard. This flooding or leaching with water is, I find, a very necessary procedure since many samples of ash which I have tested chemically contain a high level of sulphates which must be removed with water before root growth can be supported.

I have investigated many types of material as possible substitutes for this cinder ash and I find the most suitable to be three parts by volume of the sand/gravel mixture known in the building trade as ballast with one part of medium-grade horticultural vermiculite. If there are many large stones in the ballast it is as well to remove these with a 1-inch sieve before mixing in the vermiculite.

In the special case of applying ring culture to a greenhouse with a cement floor, or out of doors along a hard path bordering a fence or wall, I find a 3-inch layer of sphagnum peat, retained by bricks or breeze blocks, very satisfactory. Peat is, however, too retentive of water when used over the whole floor of the house or in troughs cut in the border soil.

For rings I employ the flexible composition type adopted as standard containers at Tilgate.

A modified J.I.P.3 compost is used in the rings, the modifications being the substitution of unsterilized fertile garden soil for sterilized loam and the omission of much of the coarse sharp sand specified in the J.I. formula, because my soil is already fairly light in texture. In point of detail I use 8 parts of soil, 3 of peat and 1 of sand and, where these parts by volume are measured in 2-gallon bucketfuls, I add 2¼ lb. of J.I. Base and 7 ounces of carbonate of lime to the resulting 3 bushels of compost. Each bushel of compost fills roughly six rings, which gives a fair indication of the quantity of compost to prepare or to purchase. The actual technique of planting in the rings is similar to normal pot culture, but certain differences should be noted. When preparing for planting, the rings are stood on the well-firmed and level aggregate surface at roughly 18-inch intervals and are filled about two-thirds full with compost. This compost is then thoroughly consolidated with a square-ended stick to ensure the necessary intimate contact between aggregate and compost. When the compost has warmed up to house temperature, the plants are transferred to the rings and further compost is thoroughly consolidated around the turned-out ball of roots to leave the final compost level about 1½ inches below the rim of the ring. Thereafter, as indicated in the discussion on the Tilgate work, culture follows the normal routine for pot growing until, with the roots visibly penetrating the aggregate and daily drenching of this layer commencing, watering in the rings is reduced until it is discontinued altogether except, perhaps, in the hottest weather of mid-summer.

My plants are fed strictly according to the routine worked out at Tilgate and I can fully confirm that the 6–6–7 feed is ideal in every way.

Out of doors exactly the same procedure is followed except that the cinder ash aggregate is contained in a trough 4 inches deep and 12 inches wide cut in the soil beneath the fence. The aggregate is 5 inches deep which means that the surface is slightly above the adjacent garden soil and so there is no tendency for rain or artificial watering to carry the soil into the aggregate.

As in the greenhouse I use the commercial stringing method for supporting the plants, but 6 foot canes introduced at the time of planting would be equally suitable.

As a point of interest, I find that south of London it pays to plant in the rings out of doors around mid April and to give barn cloche protection for the first fortnight or three weeks. The plants often make little visible growth at this early season but the roots are becoming established in the rings.

Feeding with 6–6–7 at weekly intervals, at the rate of 2½ pints per ring of a 1 in 100 dilution follows exactly the same lines as in the greenhouse and, indeed, out of doors ring culture is essentially the same as that under glass.

On the subjects of pests and diseases, I have been much impressed by the freedom from trouble when one is growing tomatoes by ring culture. In particular, I have never had to spray my outdoor plants against potato blight disease, even though neighbours' plants grown across the garden in the usual way were completely blackened by this fungus trouble.

It will be noted, incidentally, that the growing interest in ring culture of tomatoes has stimulated the supply of the various requirements, such as rings of flexible composition or plastic materials, and of suitable fertilizer. Also for the first time this season, a ring culture unit pack complete with rings, a season's requirement of feed for twelve plants and full cultural instructions, is being offered through retail sources.

No gardener need forgo the advantages of growing by ring culture for lack of facilities!

I should, perhaps, point out that the conversion of the greenhouse to ring culture in no way prevents other crops being grown. The aggregate is an excellent medium on which to stand late chrysanthemums in pots, Guernsey runner glasshouse beans do very well by ring culture, while lettuce pricked out into soil blocks or bottomless paper pots employing J.I.P.2 are completely happy when stood at normal spacing on the aggregate. There is sufficient nourishment in the compost to mature the crop and the fact that watering is restricted to the aggregate does much to minimize loss from *Botrytis*.

Here then is ring culture, a system of growing which was developed from a chance observation and which is rapidly becoming accepted by both amateur and market growers.

PLANTS ON A JOURNEY

Marjorie A. Brough

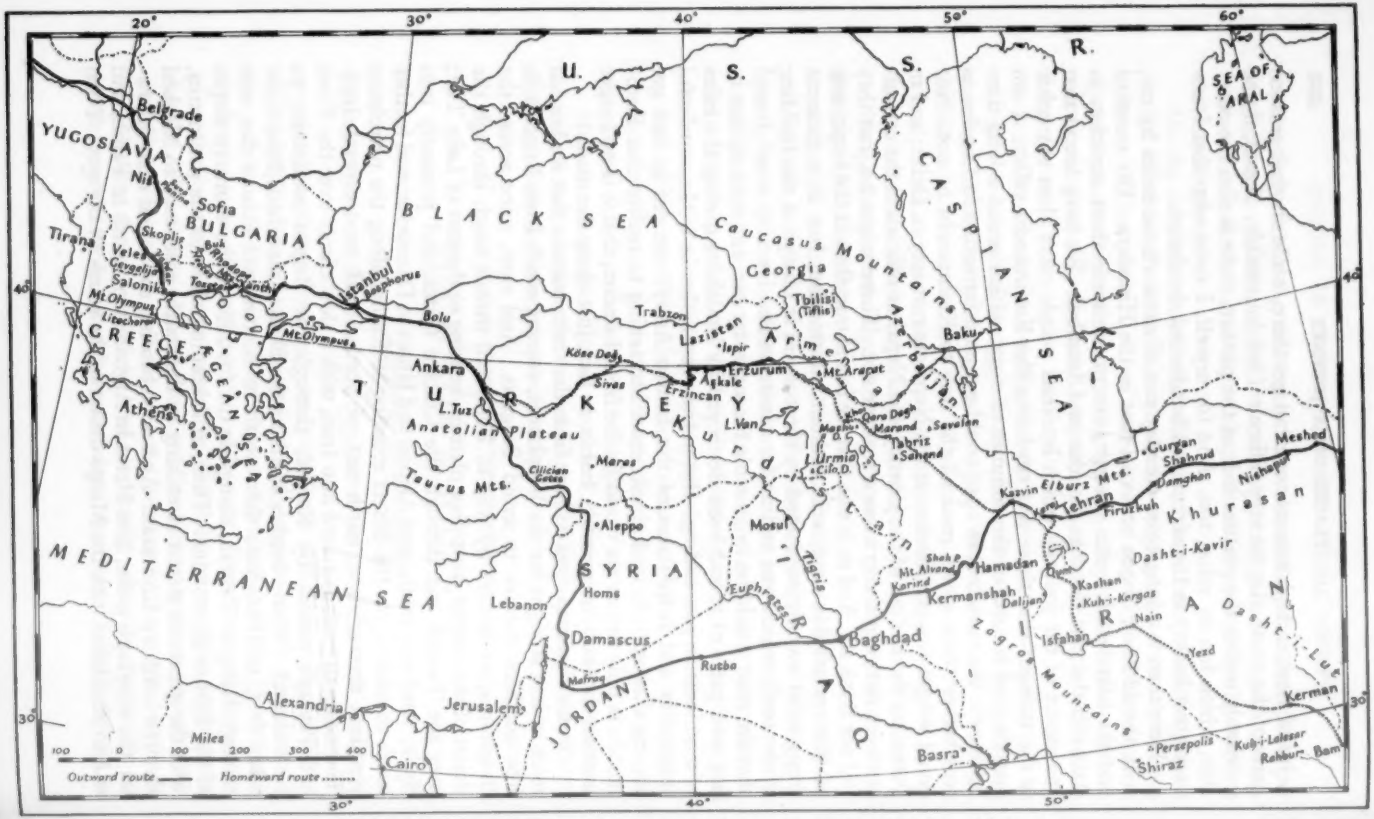
(*Lecture given on December* 3, 1957, SIR GILES LODER, BT., *in the Chair*)

FIRST I must say that my journey overland to Kathmandu, the capital of Nepal, took place during July and August—in the very heart of the period of desiccation. Once there, I walked into the Himalaya in the very depths of winter, in November and December. And to complete the journey, I came home the following year, again in July and August. The choice of these times was for various reasons unavoidable: and when you realize that most of the journey lay through desert and semi-desert, the implications and especially the disadvantages are immediately obvious. But there are advantages, too. From the practical

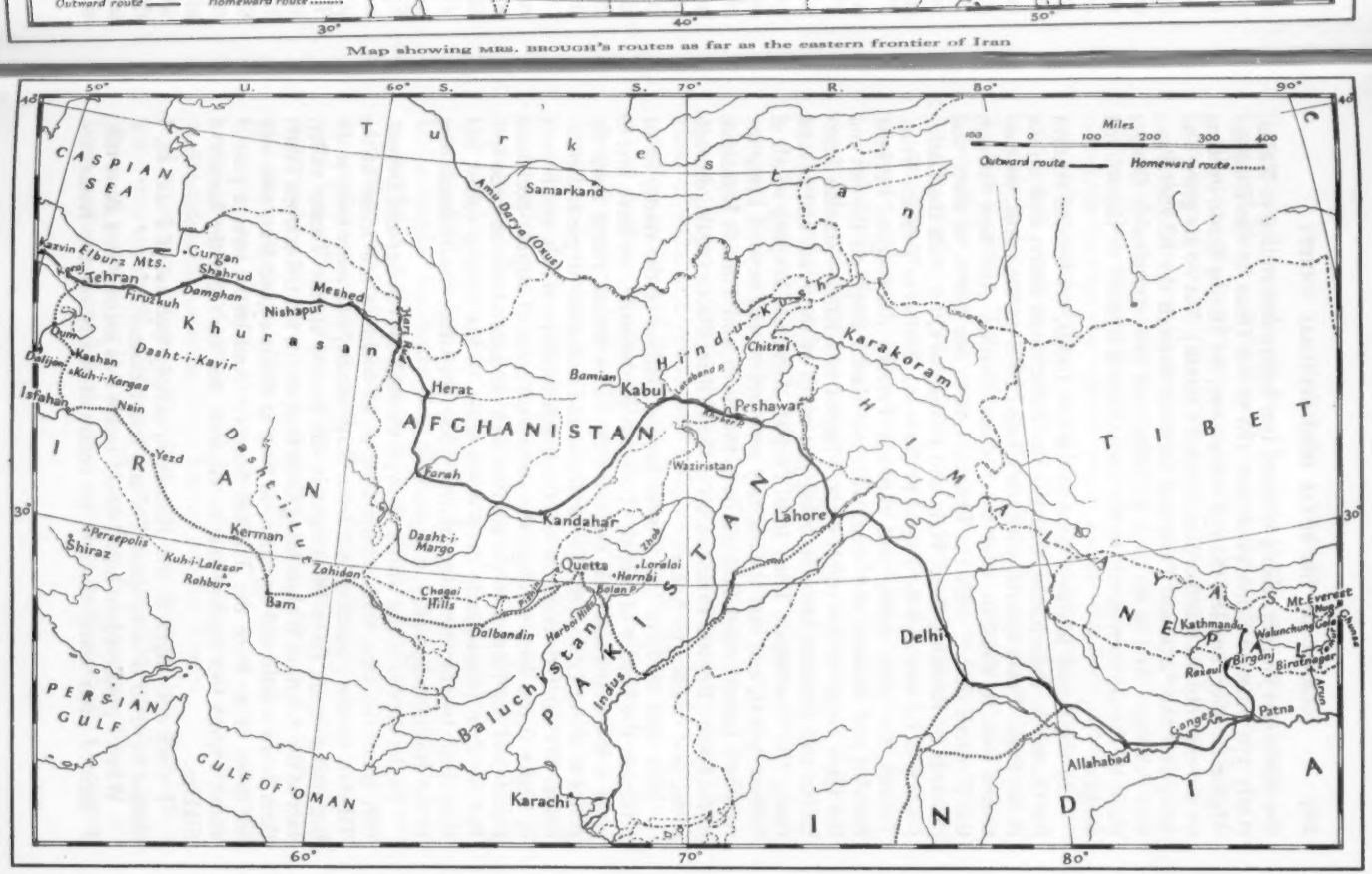
point of view, in high summer one can get there, while at other seasons parts of the route may be very difficult if not impossible. Again, if one inevitably misses the prettier side of the picture, there is also the other side, which has its value, too. And for myself, I must own that I saw very great beauty in the serene and unadorned desolation.

Here then is a long cross-country run of some 16,000 miles by car, with the addition of 300 or so on foot in the Himalaya. The outward and the homeward routes diverge, except for some short stretches in Asia and the part between London and Istanbul. We have found that the aspect of the journey which interests people more than any other is the thought that there *is* a road into the Kathmandu valley. I am speaking, of course, of the summer of 1955, which seems a long time ago now. We ourselves in 1955 could get no information in London as to whether there was a road all the way to Kathmandu or not. Nor could we get any information at the Nepalese embassy in Delhi; and in Patna, on the last lap of the journey, the Nepalese officials at the consulate were not sure if there was a road or not. There might be, but they did not think so. And so it was that we found ourselves at the beginning of this remarkable road, still without information, but in a moment being most warmly welcomed by the colonel in charge of the building of the road, which was still under construction. He very much feared that the road would be impossible for a private car, and told us that in any case parts of it had been destroyed by landslides during the rains of the monsoon just ending. But in the event—thanks to the wonderful hospitality and helpfulness of the Indian Army—we did in fact get the car through. It is, I think, most heartening to realize that Kathmandu is only five or six weeks by car from London, that it is no longer unattainable and inaccessible, but is, in fact, just along the road.

On the first map, you will see from the route marked that we headed more or less straight for the Bosphorus, coming south from Yugoslavia into northern Greece to avoid Bulgaria. And now, once across the Bosphorus, to Ankara by way of Bolu, and thence south through the desert of the central Anatolian plateau, bearing to the east of Lake Tuz; over the Taurus and through the Cilician Gates, and presently into Syria. And now south, past Aleppo and Homs to Damascus; and further south to Mafraq for the desert crossing to Rutba, along the petroleum pipe-line through the north-east of Jordan and west-central Iraq. Thence on to Baghdad; and into Iran, with a slow climb over the Pitek and Paytagh passes, by Karind, through the Zagros mountains to Kermanshah. Then a further climb up the Shah (Assadabad) Pass, some 8,000 feet, to Hamadan; then north to Kazvin and almost due east through Karaj to Tehran, alongside the foothills of the southern slopes of the Elburz Mountains. Then, still keeping close to the mountains, with the great salt desert stretching to the south, eastwards to Meshed through northern Khurasan. And now, bearing south and east, following the telegraph poles, into Herat in Afghanistan; south to Farah, and east to Kandahar with the Margo desert to the south all the way. Then



Map showing MRS. BROUGH'S routes as far as the eastern frontier of Iran



Map showing the eastern part of MRS. BROUGH'S ROUTES

the north-east journey, rising to 9,000 feet before descending to Kabul. (Only 370 miles to Samarkand, and 180 to the Oxus on the Russian-Afghan frontier; and less than 50 miles away, the Hindu Kush, bending on the east into the Karakorums, beyond Chitral.) But we are going east now, over the Lataband Pass, and forward through the Khyber Pass; into Pakistan. And in no time, to Delhi; and the interminable Ganges plain to Patna; then north to the India–Nepal frontier at Raxaul and Birganj.

On the return journey, once across the Indus, we headed straight for Quetta in Baluchistan, through the Baluchistan desert and up the Bolan Pass. From Quetta, with the Chagai Hills on the north, we continued west to Zahidan, over the Persian frontier. And now through the Kerman desert, with the Dasht-i-Lut to our north, to Bam, and onwards by Kerman, Yezd, Nain and Isfahan to Qum, with the Dasht-i-Kavir to the east and the Zagros to the west. And so to Tehran. From Tehran we went north-west through Persian Azerbaijan, between Savalan and Sahand, and then, with the Mashu Dagh on the left and the Qara Dagh on the right, on to Marand and Khoi—Russian Azerbaijan and Russian Armenia being just north of the road, and beyond them, the Caucasus. Then into Turkish Armenia, keeping south of Mount Ararat, and into the military zone before and beyond Erzurum. And now Lazistan and Trabzon lie to the north, and Turkish Kurdistan to the south. Beyond Erzincan, on to the Central Plateau again, through Sivas, and so back to Ankara.

Now that we have had a brief general outline of the route, let us return to the border of Nepal. To reach Kathmandu, we have first to cross a lower tropical belt some twenty miles broad, rising from the plains to about 1,000 feet, of loose forest and rich semi-jungle and grasslands. We climb through the wet evergreen subtropical belt, and beyond it, above 6,500 feet, through the temperate zone of largely deciduous forest, and rise further to the conifers and rhododendrons at 8,000 feet. But we then immediately drop down again to the Palung valley, and then climb two further ridges of over 5,000 feet before finally descending to the Kathmandu valley at 4,500 feet.

In the depths of the winter of 1955, through November and December, came the long walk which took us to within a few miles of the Tibetan border; starting, not from Kathmandu, but away back at the beginning again, from Biratnagar in the plains, up the Tamur valley, east of the Arun, to Walunchung Gola first, about ten miles from Tibet; then down a little and up again, to Nup at about 13,000 feet, now only six miles or so from the Tibetan border. And lastly, over a pass of about 17,000 feet further east to Ghunsa, not far from the border of Sikkim.

I shall not linger in the Himalaya, simply because if I did so, I should have no time to speak "of any lesser matter".

When I pondered on how I could tackle this journey in a short talk, I decided after some thought to centre it firstly on the homeward

journey; and secondly on Iran; because in this way we can certainly include the land and the flora to the east and west in a general picture.

We can include with southern Persia all that section of the homeward route from the beginnings of the Baluchistan desert, to Kerman in Iran —in other words, so far as plant life is concerned, we shall pass through part of the eastern section of the Sahara–Arabia–Persia–Sind desert system. Then we can climb up on to the interior Kerman–Yezd mountain chain through the west of central Persia—the flora of the region being often loosely defined as the Irano-Turanian group. Then into the north-west, where there are new influences on the flora, from Transcaucasia and Armenia. And so through to the complicated plateau of Turkish Armenia. To the eye, once one is over the frontier, the change is remarkable. After all, generally speaking, Persian Azerbaijan—apart from its higher altitudes—looks much like many other parts of the Persian plateau. But now, though semi-desert and steppe are still there, the region is diversified by a very varied relief and a very varied flora.

Cultivation along the road is quite suddenly richer; valleys and depressions are greener and brighter; there are meadows of wild flowers which appear almost lush, and mountain pasture approaching at times a really close turf. And it was as pretty as a picture, even in high summer. Pads of *Acantholimon* were magnificent in sheets of dense pink; and there were great purple patches of a vetch among the crops, and wild roses in flower along the way. Mountain valleys bore thousands of white and yellow wild hollyhocks, or were bright gold with countless millions of dwarf wild grasses in seed. There were drifts of yellow *Acanthus hirsutus*; and *Linum orientalis* in full bloom hung down along the steep roadsides. There were wide areas of ploughed land to be investigated—the vanishing and changing flora of cultivation to be looked at with special care—timorously, when the crops were still growing, and boldly (when you could get Asiatic Turkey to yourself, as you usually could) where the crops had been harvested. So it is that the road from the frontier follows first some twenty miles of lava-free limestone downs, with the white cone of Mount Ararat on the right, through the folded range of the Saitan Dağ, then on to Erzurum and Erzincan; and much of this in the military zone, with no photography and no plant-collecting. Beyond Erzincan we drop down again from the elevated broken Armenian plateau to the Central plateau: semi-desert or steppe again, but still diversified—depressions trapping rainfall, and bands of fertility along the rivers; and presently, traces of forest or scrub south of Amasya onwards. Now *Helleborus* begins and stays, and so does *Cyclamen*, and *Clematis*. And so, beyond 30° E. Long., into our small section of western Anatolia, with thick mixed woodland, dense thickets of *Rhododendron ponticum*, and a host of familiar flowers.

Let us now return and look at the Baluchistan–Iran area before going into any detail. Coming and going, we travelled something in the region of 3,000 miles in Iran. For getting to know something of the flora, it sounds a great deal, but it is in fact nothing at all. Of course,

the fact that movement was slow here—perhaps an average speed of 10 miles an hour—was a great asset. But on the other hand, I always realize that I saw all this vast area of Persia at one season of the year only; that we followed (wherever possible!) the road itself, with its set course and its given altitudes. What one does have, of course, is an impression; and the impression at the time—and it is an abiding one—is that Iran is a desert. It is, in fact, a region formed by a vast plateau, ringed around by mountains. Its rainfall is inadequate except in the north-west, and unreliable, so that life depends largely on the snows of the marginal mountains and of the two chains which cross the plateau. In summer the winds, as I know myself, are hot and dry, like the breath of an oven, and in winter no doubt there are freezing blasts from the north, affecting especially the land to the east of the country. So far as the flora is concerned, there is a brief vegetative period, a resting period in intense heat, and a long cold winter.

On a journey of this nature, one becomes very familiar with certain types of plant-habitats—sometimes clearly defined, but much more often merging into one another: the absolute desert, in which hardly a living thing is visible; the semi-desert; the open steppe; the grass steppe at heights of 4,000 to 6,000 feet; the broad stretches of rubble, bearing perhaps nothing but a loose huddling of tamarisk; the sandy stretches, some flat, some hummocky; shifting sand-dunes without plant-life, and stable sand-dunes; salt marsh in varying degrees of salinity; stony rocky slopes; porous and crumbling or adamant rock-faces; water-courses and river-gorges; and high alpine pasture at last, on my road, in the far north-west.

The most striking thing is the openness or looseness of the plant communities, and the absence of competition between plants—the striking number of solitary specimens, and the almost entire absence—on my road—of anything that could be described as a close turf.

A most striking feature is the wealth of thorns and spines and prickles. There are anything up to 500 species, of many genera, from trees to flat pad-plants, drastically armed in this fashion, and with certain species rising to great beauty, notably in the *Acantholimons* (*Plumbaginaceae*), and in the *Acanthophyllums* (*Caryophyllaceae*), in particular *A. grandiflorum* in the Barg Hills, near Quetta. Again, the thorn-cushions may be softened away to the gentler precious forms of *Dionysia* and *Gypsophila aretioides*—though they are hardly gentle. *G. aretioides*, I have heard, can be cut up with nothing less than an axe; and I recall that I collected seed of a *Dionysia* in Iran by sweeping the pads with a stiff brush into an open book.

We shall have to leave aside all reference to the most outstanding plant-families of the flora of our area: the Compositae, the Leguminosae, the Cruciferae, the Chenopodiaceae, and even the Labiatae and so forth—important as they are to man and beast. Why, they will even cure your pneumonia on the Bolan Pass with a concoction of *Nepeta glomerulosa*. And we shall have to leave aside all the ephemeral or rain

PLANTS ON A JOURNEY

FIG. 52—The main road between Jacobabad and Quetta: a "dry-wash" in the Baluchistan desert

Photos, John Brough

FIG. 53—View near the Nepal–Tibetan frontier, between Nup and Ghunsa. A peak in the Kanchanjanga massif

PLANTS ON A JOURNEY

FIG. 54—Nepal—the first ascent of the New Road to Kathmandu

Photos, John Brough

FIG. 55—Nepal—view of the Kanchanjanga range in the background, taken from a mile south of Nup

FIG. 56—Dry river bed being used as a road in Southern Persia

Photos, John Brough

FIG. 57—Southern Persia, near Zahidan. Desert has small grasses and open dwarf scrub vegetation

Photo, F. W. Allerton

RING CULTURE

FIG. 58—Tomato 'Stonor's Moneymaker' in the garden, July 6, 1957. Note that first fruits are showing colour (see p. 198)

Photo, F. W. Allerton

RING CULTURE

FIG. 59—The aggregate here is laid on a concrete surface and is retained by breeze blocks. Sphagnum peat is particularly suitable as an aggregate medium under such circumstances

Photo, Jack H. Kent

FIG. 60—A commercial ring culture crop of Tomato 'Potentate' in Hampshire, 1957. The aggregate is a fine grade of ballast (see close-up, Fig. 62)

Photo, F. W. Allerton

Photo, Jack H. Kent

RING CULTURE

FIG. 61—(*Left*) A good plant of Tomato 'Stonor's Moneymaker'

FIG. 62—(*Right*) Showing spacing of rings and a drainage sump. Sumps are provided at intervals of about 10 feet, as downward drainage beneath the aggregate is prevented by the continuous layer of concrete laid down to isolate the aggregate from the [illegible] soil beneath. Young plants as Fig. 60

FIG. 61—(*Left*) A good plant of Tomato 'Stonor's Moneymaker'

FIG. 62—(*Right*) Showing spacing of rings and a drainage sump. Sumps are provided at intervals of about 10 feet, as downward drainage beneath the aggregate is prevented by the continuous layer of concrete laid down to isolate the aggregate from the soil below and beneath. Same plants as Fig. 60

Photo, Roderick Balkham

Photo, F. W. Allerton

RING CULTURE

FIG. 63—(*Left*) Root system of tomato where ring stood on cinders. (*Centre*) Root system where ring stood on unsterilized soil. Note that only a few corky roots could be disengaged from the soil. (*Right*) Root system of plant grown in the unsterilized border soil

FIG. 64—The composition ring has been stripped off to show both ring and aggregate roots of tomato

Photos, J. E. Downward

FIG. 65—Chrysanthemum 'Sunavon' **F.C.C.** September 10, 1957. Yellow in colour. Raised and shown by Messrs. J. & C. Johnson (see pp. 219 and 221)

FIG. 66—Chrysanthemum 'Audrey Shoesmith' **F.C.C.** November 8, 1957. Pink in colour. Raised by MR. H. SHOESMITH, V.M.H. (see p. 224)

flora, of which I saw nothing; for it is undoubtedly, firstly, amongst the bulbs, the corms and the tubers, that we shall find species of more general horticultural interest. And here, of course, was the group of plants that I could not see, and had to try to find. I am often asked how it was possible to bring back any bulbs from a journey made at this time of the year; but the answer is that it was not always so very difficult. There were all sorts of things to help one. For instance, we rather specialized in sleeping in dry river-beds. This meant that in the morning one could check over the crumbling river-banks, and pick out bulbs with the greatest of ease: they were often to be found growing each at its own level in the soil along the exposed layers, like an object lesson in depth of planting. Again, the bulbous flora of steep banks could quite frequently be spotted half-exposed if the slopes had been subjected to spring torrents. Or if road-work was in progress, you could inspect the debris.

Generally, if the dry stems with their capsules were still standing, they were easy to see; the capsules of tulips and irises, for example, are for the most part of some size, often as much as 1½ inches long. These capsules are usually tough and persistent, and even if they were broken off and split, it was not always impossible to find a little seed, or even with luck to find a bulb or two. Occasionally one could spot a bulb by the protruding portion of tunic or membranous fibres round its neck, as in the case of certain Juno irises, for example. Even if there was no sign of flowering stem or umbel or capsule, even a dry withered leaf could be a guide; for in the open steppe or semi-desert even so small a fragment is just so much distinct in colour and texture. But apart from these many instances where help was forthcoming, one just had to dig and go on digging in likely places.

We now come to the great groups of *Liliaceae* and *Iridaceae*, with the emphasis on *Tulipa* in the first and *Iris* in the second; and to a very slight extent *Amaryllidaceae* will enter into the picture.

FIG. 66—Chrysanthemum 'Audrey Shoesmith' F.C.C. November 8, 1957. Pink in colour. Raised by MR. H. SHOESMITH, V.M.H. (see p. 224)

FIG. 65—Chrysanthemum 'Sunavon' F.C.C. September 10, 1957. Yellow in colour. Raised and shown by Messrs. [illegible] Johnson (see pp. 219 and 223)

AMARYLLIDACEAE

Just a word about the Amaryllids, of which we see so little on this journey. *Ixiolirion montanum* has a wide west to east distribution, from eastern Cilicia to Persia, and through to Baluchistan, to Quetta itself, to the Quetta valley, and to the north and south of it. *I. palasii*, on the other hand, comes down from the north into Afghanistan and into Baluchistan. And apart from the Ixiolirions we shall see only the *Sternbergias*, firstly *S. stipitata*, abundant in western Persia on the road between Kermanshah and Hamadan, and in the neighbourhood of Qum. And then, much later, not until after the Bosphorus crossing, on the homeward route, *S. colchiciflora*.

And of *Leucojum*, *Galanthus*, *Narcissus* and *Pancratium*, nothing at all.

Baluchistan and Afghanistan have a share in the distribution of *Colchicum luteum*. Iran has five species, distributed mainly in the west, with a specially rich vein from Kermanshah to Mount Alvand, but

extending into the north, where *C. speciosum* is found, and even to the north-east, which has *C. szovitsi*, a very interesting spring-flowering species, which wanders abroad even to Kerman and Yezd. Going west, there is an increasing number in Asiatic Turkey, and beyond it, the special abundance of the species of Greece.

Merendera sobolifera comes all the way from Europe to Khoi, and beyond it to the south. *M. trigyna* could be found up near the snows in southern Persia, though not on our route, but it appears again near Erzurum. *M. robusta* spreads from north of Tehran into both Baluchistan and Afghanistan.

LILIACEAE

Of *Lilium* proper I saw nothing at all. *Lilium* is not wholly absent either from Persia or Asiatic Turkey, nor from Afghanistan, but, of course, it is wholly absent from my route, and as a matter of fact I did not see a lily at all until in Yugoslavia, between the Greek frontier and Skoplje, a solitary flowered lily, probably *L. carniolicum* var. *albanicum*, hung out from the rock ledges in a gorge of the river Vardar.

Gagea comes most of the way home with us. There are at least four species in Baluchistan (*G. amblyopetala*, *G. persica*, *G. reticulata* and *G. lutea*). Two of these, *G. reticulata* and *G. persica*, are found in Afghanistan, which adds another of its own, *G. setifolia*. The same two come into Iran, adding one sub-species each, and they are joined by five others (*G. fistulosa*, *G. bohemica*, *G. pusilla*, *G. chlorantha* and *G. bulbifera*). Five of the Iranian species follow one home into Asiatic Turkey, and are joined there by another two, with a special congregation of species, on my road, in Turkish Armenia (*G. fistulosa*, *G. foliosa*, *G. reticulata* and *G. bulbifera*).

Lloydia we can dismiss, for they do not trouble us at all until we are well over to the west of Asia Minor. And we will pass over the alliums.

What can one say of all the members of the lily family—*Chionodoxa*, *Pushkinia*, *Hyacinthus*, *Muscari*, *Scilla*, *Ornithogalum* and so forth? The only thing that one can do with such vast numbers of species is simply to notice the marked dropping off, so far as the majority of the species are concerned, as one gets further east. *Chionodoxa*, for instance, does not appear to enter Persia at all, and *Pushkinia* gets no further than Persian Kurdistan. By and large, while one can trace nearly fifty species in this group of genera in Asiatic Turkey, the numbers have dropped off to less than twenty in Iran, and they are mostly in the north; to about half a dozen in Baluchistan, and to only two or three in Afghanistan.

TULIPA

In Iran one could touch certainly or doubtfully every single section of SIR DANIEL HALL's classification* of the two main divisions (Erioste-mones and Leiostemones) of the genus *Tulipa*. In the Eriostemones,

* The help is acknowledged here of SIR DANIEL HALL's book, *The Genus Tulipa*.

among the Australes: *T. urumiensis* and *T. sylvestris*; among the Saxatiles: *T. humilis*, *T. violacea* and *T. aucheriana*; among the Biflores: *T. biflora*, *T. turkestanica* and *T. polychroma*. In the Leiostemones, among the Clusianae, the *aitchisonii* group will hardly concern us in Iran, nor on my route in Afghanistan; but the *montana-chrysantha* group certainly would, and the *linifolia-batalini* group might. The Gesnerianae would almost certainly not concern us at all, admittedly; but in the Oculus-Solis group, *T. systola* certainly would, and very probably *T. stapfii* and *T. undulatifolia*. The Eichleres would enter into the picture, and lastly, even the Kolpakowskiana section, centred far to the north and east of Iran.

Eriostemones

(*a*) *Australes*

T. urumiensis and *T. sylvestris* are found in the north-west, and the group will not be touched upon again in our area until you find *T. australis* in Baluchistan (sometimes there known as *T. biebersteiniana*), in the juniper tracts of the Zarghun range.

(*b*) *Saxatiles*

The *humilis-violacea* tulips are found in the north-west—*T. pulchella* does not enter Persia from Turkey—although they do wander further east roughly to north of Tehran, where they are joined by *T. aucheriana*, and thence all three go south to the mountains around Isfahan. *T. humilis* strays a little further, on the north to Damghan, and on the south to Yezd; and into Afghanistan in the Hari Rud valley. *T. violacea* wanders south of Hamadan on Mount Alvand, and on the north climbs over the mountains into Turkey.

(*c*) *Biflores*

This group is by no means centred on Persia. They have a north-east distribution, from south Russia to Turkestan, and probably further east. *T. biflora*, *T. turkestanica* and *T. polychroma* are widely reported from Iran: *polychroma* abundantly from west and east of Kerman, and pushing up to the north-west through the Isfahan mountains, and the mountains around the town of Iraq; and into Afghanistan and Baluchistan. The other tulip of the group, *T. tarda*, does not appear to wander very far from eastern Turkestan. And *biflora* and *turkestanica* are reported principally from the Persepolis triangle.

(*d*) *Clusianae*

As I have said, the *aitchisonii* group does not concern us, except that the true home of *T. clusiana* itself is in Persia, striking off from there into Iraq on the one hand, and beyond Afghanistan as far as Chitral on the other. I have been unable to find any precise Persian localities for it, apart from one in the Shiraz area. It does not appear to have been collected from the north-west, where instead in the Tabriz area one finds both *T. montana* and its yellow form *chrysantha*. There is a query surrounding the tulips under these two names in Baluchistan, Afghanistan

and Persia, which we must leave to one side. There is insufficient evidence as to the distribution in Iran of *T. linifolia*, and its albino form, *batalini*, from Bokhara; and many of the yellow tulips of north Persia are uncertainly known.

(*e*) *Gesnerianae*

They do not concern us, except in so far as some of the Persian yellow tulips may be forms of this section.

(*f*) *Oculus-Solis*

Tulips of this section, the scarlet, woolly-coated tulips of the middle east, keep to the west so far as Iran is concerned, west at any rate of the Tehran-Isfahan line, and to the north-west, where you will find the *stapfii–systola–undulatifolia* group; and further to the east it would raise again the vexed question as to what the "montanas" and "chrysanthas" of these regions really are. And then there is *T. borszczowii* of Herat. And the north-west group is joined by *T. lanata*, one of the finest of all tulips.

(*g*) *Eichleres*

These are of central asiatic origin, with perhaps *T. fosteriana* the most brilliant. *T. eichleri* has been reported from between Nain and Qum. I do not know the precise locality, but I imagine it might well be on the Kuh-i-Kargas.

(*h*) *Kolpakowskianae*

These tulips are centred to the north and east of Iran. *T. lehmanniana* is recorded from both Persia and Afghanistan, the precise localities of both being unknown to me.

Once in Asiatic Turkey, the pattern is a little simpler. We drop the Kolpakowskianae altogether, and the Eichleres, and the Biflores, and probably all the Clusianae. But in the Oculus-Solis group we will have *T. stapfii* and *T. undulatifolia*, and add three or four others; and we shall have the Gesnerianae—about eight of them—with *T. gesneriana* itself between Erzurum and Ispir. In the Saxatiles, we shall have *T. pulchella*, of course, and *T. violacea*, and we shall add *T. saxatilis*. In the Australes, we shall lose our Persian ones, but add two or possibly three new species. And of course we shall have the solitary species, *T. sprengeri*.

FRITILLARIA

Baluchistan has only two species that I know of: *F. gibbosa*, reported from the Pishin valley, with which I am not familiar; and *F. karelinii*, a beautiful pink fritillary—or perhaps it is now excluded from the genus—of 6 inches or so. It is reported from the Persepolis area in Persia, and again from north Persia, above Gurgan (formerly called Asterabad), and is found in Afghanistan also. But I found what was very possibly this species near Dalijan on the road to Qum, that is to say, less than fifty miles from a well-known locality for it at Kashan, to the west of

Dalijan. *F. imperialis* is certainly found in Afghanistan and in Persia, in various places in the south-west and west—but well away from my road—and in Persian Kurdistan, where there is quite a group of Persian fritillaries, so that I missed it altogether. *F. olivieri* I certainly did not see, although I believe it grows, apart from other ill-defined localities, on Mount Alvand above Hamadan. Near Isfahan I found some broken-off stems of a fritillary, bearing two or three, and sometimes four club-shaped capsules, with a little seed in some of them. I could not find the bulbs, even after much searching. Perhaps it was *F. reuteri*. I found two more species in northern Iran, one south of Tabriz, and the other beyond it. The southern one was always one-flowered, and I was able to collect several bulbs and a good deal of seed, though I do not yet know what species it is. The northern one was almost certainly *F. karadaghensis*. It was a little taller than the southern one, and had had from one to two flowers on each stem. I had found also the loose stems with empty capsules of what was probably a fritillary while we were crossing the Zagros mountains on the outward journey, and very similar stems of 4 inches or so, and full capsules—this time on the way home, in the mountains beyond Erzurum, and again near Ankara. These two fritillaries were probably *F. zagrica* and *F. armena* (or *caucasica*) respectively.

EREMURUS

There are or were five species of *Eremurus* in Baluchistan. *E. velutinus* is abundant in the Pishin valley, and even nearer Quetta in the north; and it has also been reported from the Harboi Hills, and from other localities. *E. aurantiacus* is found, for instance, in and near the Quetta valley. *E. persicus* grows in both the Quetta and Pishin valleys. *E. aucherianus* grows north-west of Loralai, and is common in the Zhob district; and *E. stocksii* is common at Quetta itself.

So far as I am aware, none of these, with the exception of *E. aurantiacus*, is found in Afghanistan—which, however, has *E. griffithii* in addition—but it is not surprising to find that, with the exception of *E. stocksii*, the other four, according to the collectors, are, or were, to be seen in Persia also, and are joined by one, or possibly two new ones. And not unexpectedly, all of these are reported from the Isfahan–Shiraz–Kerman–Yezd area. What was so interesting was to follow the course of this Baluchistan–Persian group along the roadside, seeing them drop out between Dalbandin and the Persian frontier in the shifting sand areas, recovering again suddenly just after Zahidan, and failing again all along that section of the road which has the tail-end of the Lut desert to the north, and the Kerman desert to the south, and then increasing towards Kerman into a multitude of thousands of dry spires with, as one progressed northwards, an abundance of unshed seed.

In Iran there is a second outburst of *Eremurus* in the north-east, starting near Firuzkuh (*E. albocitrinus*) and continuing east along the road to Shahrud (*E. bungei*), on to Nishapur and further to Meshed

(*albocitrinus* and *bungei*) where in northern Khurasan the group is joined by *E. spectabilis*, found also in Asiatic Turkey, and distributed on the one hand in the Caucasus and southern Georgia, and on the other hand in the Lebanon and Anti-Lebanon.

ASPHODELUS

There is only one asphodel in Baluchistan: the widely distributed monocarpic *A. tenuifolius*, or a sub-species of it; and it follows the road all through southern Persia, and even starts heading north. It is joined in Asiatic Turkey, on my road, by *A. microcarpus* (*ramosus*), which I saw growing just forty or fifty miles from the Bosphorus in Anatolia, just as I have seen it below Litochoron in northern Greece.

ASPHODELINE

This is wholly absent from Baluchistan, but there is one species, *A. tenuior*, a Caucasian species, in the province of Azerbaijan in Persia, which continues into Turkish Armenia. *A. lutea* takes over towards the west of the Anatolian plateau, and comes with one all through northern Greece.

IRIDACEAE

Among the Iridaceae, we can pass over *Romulea* altogether; they do not appear to be distributed eastwards into Persia. And I think we may pass over the ubiquitous *Gynandriris sisyrinchium*. So that we are left with *Iris* itself, with *Crocus*, and with *Gladiolus*.

So far as my journey is concerned, *Iris* was a constant companion, and more particularly, from the point of view of numbers, east of the Yugoslav frontier. Along the road as a whole there are so many species involved that I have had to decide to say a few words only of the irises of the Baluchistan–Persian section of the route. And from Ghunsa near Tibet, with its tens of thousands of *I. decora*, it is a long way to the irises of Baluchistan. There are at any rate four iris species there; three of them are rhizomatous: *I. songarica* and *I. ensata*, both Apogons, and *I. falcifolia*, which is a Pogon iris. The fourth is a Juno iris, *I. stocksii*. All four of them are found in Afghanistan also, but only one of them, *I. songarica*, appears to occur in Persia. It finds the Dalbandin to Bam stretch quite impossible, but starts up again quite some time before Kerman in the semi-desert, and from there it keeps going north-west for over two hundred miles. It was not difficult to spot it from the road: the leaves were, of course, completely withered and burnt, but the crowded tufts were very noticeable, especially as there was no grass in the area to confuse the eye. To begin with, capsules were absent, but as the miles went by they began to appear, empty at first, and later still full of seed. And eventually you could see even the crisp sunburnt rags of the blue-purple flowers. In Persia, *I. songarica* was joined very soon by *I. halophila*, a Spuria; and presently, locally, by *I. spuria* itself, or a variety of it; and still later, in the north-west, by *I. pseudacorus*.

Several irises of the Oncocyclus section are reported from Persia, though I saw very few of them. *I. susiana* is recorded from near Isfahan, far from its centre of distribution. *I. iberica*, *I. acutiloba* and *I. paradoxa* are all three reported from northern Persia. And in addition there are the two 6-inch species, *I. meda* and *I. polakii*.

As for the Juno irises of Persia, Afghanistan and Baluchistan—I was tormented by them. I saw signs of my first one near the Turkish–Syrian border on the outward journey: broken, yellow-brown stems and empty capsules, and could find no trace of the bulbs. And again, in Persia, especially, as I remember, east of Tehran, and on the homeward route, a trail of stems and capsules; and further east, in Afghanistan, both on the Lataband Pass and on the Khyber.

The solitary Juno of Baluchistan, *I. stocksii*, is joined by others in Persia. *I. persica* is reported from several localities in Persia, including one some 240 miles west of Kerman, although I did not see it myself until west of Erzincan in Turkey, where the road climbs round the Köse Dağ—so that it was presumably the variety *purpurea*. Here I found the only Juno iris whose seed was really easy to collect in quantity. The plants were growing on dry, steep, rocky ground, between pads of *Acantholimon* in full bloom, in an area which yielded bulbous plants of other genera. But so far as this little Juno was concerned, although the capsules had split, they were still full of seed, and the colonies looked like nests of fledgings with their beaks wide open. I found what was probably the Juno *I. caucasica*, too, first in north-west Persia, south of Tabriz, and later in Turkish Armenia. What was strange, if it was indeed *I. caucasica*, was that the capsules were empty, and I found only a few seeds after a long search. And of the other, taller species of which seed was collected in north and north-west Persia, in six or seven localities, I will know nothing until they grow on and flower.

GLADIOLUS

I do not know of any gladiolus in Baluchistan, and have heard of only one in Afghanistan, *G. kotschyanus*, which grows in Persia also, and, I believe, in Turkish Kurdistan. In south Persia, we have *G. persicus*, near Petropolis and Shiraz, that is to say far to the west of my road. And we have *G. segetum*, on its long journey from the Mediterranean region to Turkestan, in the Shiraz-Isfahan area. *G. segetum* is also found in the north, and so are *G. communis* and *G. atroviolaceus*, the latter with a wide distribution from Azerbaijan to Tehran, on the one hand, and to Isfahan on the other. And another species, close to *G. persicus*, has been found in Persian Azerbaijan.

But so far as I was concerned, gladiolus made me stand in my shoes and wonder, like the child in the nursery rhyme. Again and again, especially from Yezd to Nain, between Isfahan and Qum, and again in the north-west, I used to spot from the car withered tufts of leaves, sometimes dwarf, from 6 to 9 inches tall, sometimes a foot or more high, which, when I went over to them, looked very much like the

remains of gladiolus. I always dug them up, but on no occasion could I find any corms at all, nor a rootstock of any kind, nor any capsules. I came to the conclusion that corms and seeds had been enjoyed by certain of the local animals. So it was that I did not find a single gladiolus corm until well into Asiatic Turkey, west of Erzurum. And here, this gladiolus was not only in seed, it was occasionally still showing traces of colour in its withered petals. It is a very common species, but a very pretty one: a variety of *G. imbricatus*, known as *crispiflorus*. With it there was a *Caltha* species in seed, and a little higher up, quantities of a *Hyoscyamus*, also in seed, and higher still, thousands of plants of our old friend *Gentiana septemfida*, no doubt *G. septemfida cordifolia*.

CROCUS

Baluchistan has no crocus that I know of; and neither has Afghanistan, so far as I am aware, except *C. speciosus*; unless *C. korolkowi* has ever been found on the Afghan side of its frontier with Russia. I know of only five crocus species in Persia (*C. sativus* var. *haussknechtii*, *C. caspius*, *C. cancellatus*, *C. speciosus*, and *C. biflorus* var. *violaceus*). All of these, with one exception, are autumn-flowering, and all of them are in the north or north-west. Of these, I saw only one, *C. sativus* var. *haussknechtii*, at about 7,000 feet on the Shah pass between Kermanshah and Hamadan. But Turkey has over thirty species of crocus, counting the varieties of certain of these species. Naturally, they avoid the central plateau, except for the Ankara–Sivas–Maras triangle, where one can find *C. ancyrensis*, and from where *C. danfordiae* and *C. suterianus* have also been collected. The great crocus areas of Turkey step aside to let the road go by, even though we have, to the north of it, Lazistan, and the marvellous province of Trabzon, not so far away. And the crocuses of these regions stay there, except that a variety of *C. vallicola* does come south into the mountains around Erzurum; and so does *C. aërius*, which goes further south into the mountains of Kurdistan; and, again, it travels far to the west to the region of the Bithynian Olympus, where it is joined by several other species. And the only other crocus to be found in our high river-valley is *C. cancellatus*, between Erzurum and Erzincan, in the valley of the Tuzla. And you would find it again further to the south among the crocuses of Kurdistan, with *C. karduchorum* and *C. zonatus*. Near Bolu, you will find a variety of *C. biflorus*, which follows you to the Bosphorus, and towards the Bosphorus, another variety of *C. biflorus*; and towards the Bosphorus, too, there is *C. pulchellus*, and just occasionally, from Bolu, a corm or two of *C. suterianus*. And we leave all the other crocuses of Asiatic Turkey far away in their special domains.

"Desiccation" and "ripening", so far as these geophytes are concerned, are often spoken of as if they were the same thing; but they are quite distinct. I can only record that I never, on any occasion, saw any bulbs, or corm, or tuber, which was "desiccated". They were not shrivelled, but were "living and partly living" like the women of Canterbury.

PRIMULA

If you are very interested in primulas, you will have noticed, when we looked at the maps of the route, the proximity of the road to the known localities of several primulas of the Floribunda section. In Baluchistan, there is *P. lacei*, from the limestone fissures at Torkhan, between Harnai and Loralai. In Afghanistan, there is *P. floribunda* itself, extending into the Khyber and into Waziristan from its centre of distribution in the north-west Himalaya. In west Persia, there is *P. bornmülleri*, akin to the Baluchistan species, growing not far from Karind, which, you will remember, we passed on the way to Kermanshah. Then, not much further south in west Persia, there is *P. gaubeana*, about 160 miles from Karind, and yet not akin to its near neighbour. And of course in the Cilo Dağ area in Turkish Kurdistan, only about 50 miles south-west of Khoi, there is *P. davisii*, whose closest relation is *P. gaubeana*.

Baluchistan, then, has a primula, and a very precious one. Afghanistan has *P. floribunda*, as we have said, and it has, also, *P. capitellata* (Eu-Farinosae), a high-altitude member of the Farinosa section, associated with *P. farinosa* and *P. scotica*; and in addition, it has two other members of the section, *P. rosea*, and *P. warshenewskiana*, (sub-section Auriculatae), extending into Afghan territory from the north-west Himalaya.

P. capitellata is fairly common in the high mountains of Persia: high up, for instance, about 80 miles west of Bam, near Rahbur, on the Kuh Lalesar. And Persia, too, has *P. auriculata*, on Mount Alvand, for example, south of Hamadan; or again near the frontier with Turkey, south and a little west of Urmia, at Sivik. This primula is abundant, too, in certain localities in Turkey. I saw it near Aşkale, east of Erzincan, on the high mountain road there, growing in boggy ground; and with it, in this locality, was another sumptuous bog primula with yellow flowers, which has not yet been identified. And lower down the pass, oddly enough, I found the alpine form of *P. auriculata*, *P. auriculata* var. *calva*. *P. algida* (Eu-Farinosae) is found both in Persia and in Turkey; like *P. capitellata*, it is close to *P. farinosa*, and, like it, it is a primula of moist alpine and sub-alpine meadows.

And in Turkey, the English primrose comes remarkably far east to meet the returning traveller. When I saw it, I could not imagine what it could be; it looked very like an English primrose, but it was growing in a decidedly fastidious fashion, in a very damp gulley in a patch of woodland, where cyclamen and hellebore grew in the higher reaches; and here the primrose plants grew without exception only on the steep sloping sides of the gully where water trickled down, and copied, quite precisely, the habits of *P. petiolaris*, as I saw it in eastern Nepal.

GESNERIACEAE

At four places, between Xanthi, in Greece, and Niš, in Yugoslavia, the road has a special interest; for at these points, it cuts through great Gesneriaceous-bearing gorges.

A few miles past Xanthi, on the southern edge of the Rhodope

mountains, is the small village of Toxotai, where the road crosses the Nestos; and if you look up to the right, you can see the great walls of the gorge, about five minutes' walk away. Here you will find *Haberlea rhodopensis*, and here is probably its most southern locality—not, as has been reported, Buk, much further up the river.

Our next point is in the gorge of the river Vardar, half a mile before you reach the village of Demir Kapija in Yugoslavia, about twenty miles beyond the Greek–Yugoslav frontier at Gevgelija. Here we can see *Ramonda serbica*.

About 40 miles further on, you will find *Ramonda serbica* again, just a mile or two before Veles, that is to say about thirty miles from Skoplje.

Some 100 miles due north of Veles, near Niš, on the Salonika-Belgrade road, is the Suva Planina, where *Ramonda nathaliae* was found in 1879. Still closer to Niš, in the gorge at Jelasnica, *Ramonda nathaliae* and *R. serbica* grow together.

The Thessalian Olympus lies about 60 miles south of Salonika, and here we shall find *Jankaea heldreichii*, asleep in the sun.

In conclusion, I am indebted to the Everest Foundation Trust Fund, in respect of my work in Nepal.

I should like to express my thanks to Dr. George Taylor, and to Dr. H. R. Fletcher, to Major and Mrs. Knox Finlay, and to Mr. and Mrs. Renton, in particular, for receiving and tending the material sent back from Nepal.

I have to thank the staff of the British Embassy in Kathmandu, and His Excellency the Nepalese Ambassador, Mr. Manandhar.

NOTE FROM A FELLOW

Cyclamen pseudibericum and Pleione limprichtii

THE writer of "Wisley in March" refers to *Cyclamen pseudibericum* as "difficult in cultivation"—but is it? I have had it for many years in the open; here, for five years it has thriven and flowers freely on a miniature cliff in full sun in the medium natural loam and a rainfall of 45 inches. In the garden of the late JOHN GRAY at Saxmundham a patch throve for at least twenty-five years at the base of a large *Azara microphylla*, on the north side, the only attention an annual dressing of leaf-mould. Does it not depend on the choice of position?

In the list of awards, referring to *Pleione limprichtii* it says that "it is hardy, at least in a cold house". There is no doubt about its hardiness in the open, for my friend HERR SCHACHT, of the Munich Botanic Garden, recently told me that it is quite hardy there. Here it may require a pane of glass to throw off rain, usually recommended for pleiones. I doubt whether this is necessary if the bed is raised and drainage good, as some *P. formosana* accidentally left outside the cloche last autumn are in good health despite torrents of rain. Perhaps another myth exploded!

Porlock, Somerset. E. B. ANDERSON.

WISLEY TRIALS, 1957

CLIMBING FRENCH BEANS

Thirty-five stocks of climbing French beans were received at Wisley for trial in 1957. The trial was sown on May 16, 1957, in drills 1½ inches deep and 3 feet apart; the individual beans were spaced 4½ inches apart in the drills. To control bean seed fly (*Delia cilicrura*), the drills were treated before sowing with 1½% Aldrin dust at the rate of 1 ounce per 10 yards run of drill. After germination the seedlings were thinned to 9 inches apart. Hazel sticks were used to support the plants.

The ground was single dug during the winter of 1956–7 and a base dressing of fertilizer consisting of hoof meal at 2 oz. per sq. yd., superphosphate of lime at 3 oz. per sq. yd. and sulphate of potash at 1 oz. per sq. yd. was applied ten days before sowing.

The trial was inspected by a sub-committee of the Fruit and Vegetable Committee on September 20, 1957, and on its recommendation the Council of The Royal Horticultural Society have made the following awards to climbing French beans.

The number in brackets after the description of the stock was that under which it was grown in the trial.

Seeds white

PHENOMENAL. (Sent by Messrs. Nutting & Sons Ltd., Merstham, nr. Redhill, Surrey.) **A.M.** September 20, 1957. Plant 7 feet high, much branched, dark green foliage; pods light green, 8½ inches long, ½ inch wide. Very freely produced in large loose clusters, six pods to a cluster. [19]

WESTLANDIA ORIGINAL STRINGLESS. (Raised, introduced and sent by Messrs. Gebr. van den Berg N.V., Naaldwijk, Holland.) **A.M.** September 20, 1957. Plant 7 feet high, much branched, light green foliage; pods light green, 5½ inches long, ⅝ inch wide, stringless. Very freely produced in small clusters, four pods to a cluster. [29]

CAPTAIN CARLSEN. (Raised, introduced and sent by Messrs. C. Beemsterboer Pty. Ltd., Beemsterpad 1–3, Warmenhuizen, Holland.) **H.C.** September 20, 1957. Plant 6 feet high, much branched, dark green foliage; pods medium green, 7½ inches long, ⅝ inch wide. Freely produced in compact clusters, five pods to a cluster. [31]

KEYSTONE BLUE LAKE STRINGLESS. (Raised, introduced and sent by Messrs. Corneli Seed Company, 101 Chouteau Avenue, St. Louis 2, Missouri, U.S.A.) **H.C.** September 20, 1957. Plant 6 feet high, much branched, dark green foliage; pods light green, 5½ to 6 inches long, ⅝ inch wide, stringless. Freely produced in compact clusters, four pods to a cluster. [14]

PHENOMENE CLAUDIA. (Raised, introduced and sent by Messrs. L. Clause S.A., Bretigny-sur-Orge, France.) **H.C.** September 20, 1957. Plant 7 feet high, much branched, dark green foliage; pods medium green, 8½ inches long, ⅝ inch wide. Freely produced in large loose clusters, four pods to a cluster. [20]

PRESIDENT ROOSEVELT. (Sent by Messrs. Piet van der Veld, Lisse, Holland.) **H.C.** September 20, 1957. Plant 7 feet high, much branched, dark green foliage; pods dark green, 7½ inches long, ½ inch wide, stringless. Freely produced in compact clusters, three pods to a cluster. [18]

PRIME PAK. (Raised, introduced and sent by Messrs. Ferry-Morse Seed Co., Mountain View, California, U.S.A.) **H.C.** September 20, 1957. Plant 6 feet high, much branched, dark green foliage; pods medium green, 6 to 6½ inches long, ½ inch wide, stringless. Freely produced in compact clusters, five pods to a cluster. [10]

WHITE PERFECTION. (Raised, introduced and sent by Messrs. Vilmorin-Andrieux S.A., 4 Quai de la Mégisserie, Paris, France.) **H.C.** September 20, 1957. Plant 5½ to 6 feet high, much branched, light green foliage; pods light green, 4½ to 5 inches long, ⅝ inch wide, stringless. Freely produced in compact clusters, five pods to a cluster. [23]

Seeds purple

GUERNSEY RUNNER IMPROVED. (Raised, introduced and sent by Messrs. Watkins & Simpson Ltd., 27/29 Drury Lane, Covent Garden, London, W.C.2.) **H.C.** September 20, 1957. Plant 4½ feet high, much branched, light green foliage; pods medium green, 7½ inches long, ⅝ inch wide. Freely produced in compact clusters, two pods to a cluster. [5]

VEITCH'S CLIMBING. (Sent by Messrs. Nutting & Sons Ltd., Merstham, nr. Redhill, Surrey.) **H.C.** September 20, 1957. Plant 4½ feet high, much branched, light green foliage; pods medium green, 7½ inches long, ½ inch wide. Freely produced in compact clusters, two pods to a cluster. [4]

EARLY-FLOWERING CHRYSANTHEMUMS

One hundred and twelve stocks of chrysanthemums were grown at Wisley in 1957. Twenty-seven of these were grown for the first time having been selected during 1956 for trial at Wisley by the Joint Chrysanthemum Committee of The Royal Horticultural Society and The National Chrysanthemum Society.

Cuttings were rooted during February and March, the rooted cuttings were potted up into three inch pots and grown on in a cool greenhouse. The plants were removed from the pots and planted in a cold frame from which they were planted out in the open ground on May 8, 1957. Twelve plants of the disbudded varieties and six plants of the pompon and spray varieties were grown. The disbudded varieties were stopped, where necessary, to encourage the production of eight to twelve blooms per plant.

Control of chrysanthemum eelworm (*Aphelenchoides ritzema-bosi*) was obtained by using sprays of Parathion at 0·01 per cent active ingredient.

The trial was inspected by the Joint Chrysanthemum Committee on September 2, 12, 26, and 27, 1957, and on its recommendation The Royal Horticultural Society and The National Chrysanthemum Society have made jointly the following awards to chrysanthemums after trial at Wisley.

The varieties are arranged in this report according to the classification of The National Chrysanthemum Society.

The number in brackets after the description of the variety was that under which it was grown in the trial.

SECTION 21. OUTDOOR VARIETIES, REFLEXED

(*a*) Large flowered

White

CAPITAL. (Raised, introduced and sent by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.) **A.M.** September 2, 1957, as a

disbudded variety for garden decoration. Plant 2½ to 3 feet high, compact and erect, bearing flower stems 18 to 20 inches long. Flowers 5½ inches diameter, outer florets white, inner florets cream. [37]

Red

SULTAN. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd., Mayford Nurseries, Westfield, Woking, Surrey.) **A.M.** September 2, 1957, as a disbudded variety for garden decoration. Plant 4 feet high, compact and erect, bearing flower stems 21 inches long. Flowers 6¼ to 6½ inches diameter, reddish mahogany, reverse buff. [102]

(*b*) Medium flowered

Light Bronze

JOSEPH REID JOHNSON. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 2, 1957, as a disbudded variety for garden decoration. Plant 3 to 3¼ feet high, compact and erect, bearing flower stems 24 inches long. Flowers 4¾ to 5 inches diameter, a shade between Buttercup Yellow (H.C.C. 5) and Yellow Ochre (H.C.C. 07), reverse deeper. [70]

WILLIAM DODD. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** September 2, 1957, as a disbudded variety for garden decoration. Plant 3½ to 3¾ feet high, compact and erect, bearing flower stems 20 to 22 inches long. Flowers 6 inches diameter, a colour near Yellow Ochre (H.C.C. 07), inner florets slightly flushed bronze. [87]

Yellow

SUNAVON. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 2, 1957, as a disbudded variety for garden decoration. Plant 3 to 3¼ feet high, compact and erect, bearing flower stems 20 inches long. Flowers 4¾ to 5 inches diameter, clear bright Canary Yellow (H.C.C. 2) (Fig. 65). [69]

(*c*) Small flowered

White

GARDEN WHITE. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** September 2, 1957, as a spray variety for garden decoration. Plant 2 feet high, compact and bushy, bearing flower stems 18 inches long. Flowers 3¾ inches diameter, outer florets white, inner florets creamy yellow, reverse white. [26]

SECTION 24. OUTDOOR VARIETIES, POMPON

(*a*) Tall

Yellow

POPPET. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **F.C.C.** September 27, 1957, as a spray variety for garden decoration. Described R.H.S. JOURNAL, **80**, p. 141 (**A.M.** 1954). [9]

TIPTOE. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 2, 1957, as a spray variety for garden decoration. Plant 1½ feet high, compact and bushy, bearing flower stems 10 inches long. Flowers 2⅛ inches diameter, outer florets Canary Yellow (H.C.C. 2), inner florets Lemon Yellow (H.C.C. 4). [5]

White

CAMEO. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 27, 1957, as a spray variety for garden decoration. Plant 2 to 2¼ feet high, compact and erect, bearing flower stems 8 inches long. Flowers 2½ inches diameter, outer florets white, inner florets cream. [1]

(*b*) Dwarf

Pink

FAIRIE. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 2, 1957, as a spray variety for garden decoration. Plant 16 to 18 inches high, compact and bushy, bearing flower stems 8 to 10 inches long. Flowers 1¾ inches diameter, Magenta (H.C.C. between 27/2 and 27/3), inner florets touched bronze. [15]

Red

IMP. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 2, 1957, as a spray variety for garden decoration. Plant 22 to 24 inches high, compact and bushy, bearing flower stems 10 to 12 inches long. Flowers 2 inches diameter, a much deeper brighter red than Brick Red (H.C.C. 016). [22]

SECTION 25. OUTDOOR VARIETIES, ANY OTHER TYPES

Yellow

PREMIERE. (Raised, introduced and sent by Messrs. Napiers, Stepswater Nurseries Ltd., Taunton, Somerset.) **A.M.** September 12, 1957, as a spray variety for garden decoration. Plant 3½ to 3¾ feet high, compact, bushy, erect, bearing flower stems 18 to 20 inches long. Flowers 3¼ to 3½ inches diameter, anemone centred, Aureolin (H.C.C. 3/1). [30]

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1957

CHRYSANTHEMUMS

The Royal Horticultural Society and The National Chrysanthemum Society have made jointly the following awards to chrysanthemums after exhibition at the Shows of The Royal Horticultural Society and The National Chrysanthemum Society, on the recommendation of the Joint Chrysanthemum Committee.

EARLY-FLOWERING CHRYSANTHEMUMS

Chrysanthemum 'Joseph Reid Johnson' F.C.C. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, light bronze. Described R.H.S. JOURNAL **82,** p. 219 (**A.M.** 1956). Raised by Messrs. J. & T. Johnson, shown by Messrs. J. & T. Johnson and Mr. Ron Thistlethwaite, Fox Lane Nursery, Bell Barr, Hatfield, Herts.

Chrysanthemum 'Sunavon' F.C.C. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, yellow. Described R.H.S. JOURNAL, **82**, p. 220 (**A.M.** 1956). Raised and shown by Messrs. J. & T. Johnson (Fig. 65).

Chrysanthemum 'Aileen' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, salmon. Flowers 4 inches diameter; florets long, narrow, slightly overlapping, pointed, quilled, Salmon (H.C.C. between 412/2 and 412/3), reverse Barium Yellow (H.C.C. 503/3). Raised and shown by Messrs. J. & T. Johnson, Tibshelf, Derbyshire.

Chrysanthemum 'Ashfield Pink' A.M. September 10, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, pink. Flowers 5 inches diameter; florets long, medium width, overlapping, blunt, outer florets Phlox Pink (H.C.C. 625/3) fading towards margins, inner florets Phlox Pink (H.C.C. between 625/2 and 625/3), reverse cream. Raised and shown by J. Matthews, Esq., No. 34A Sutton Road, Kirkby-in-Ashfield, Notts.

Chrysanthemum 'Bronze Brenda Talbot' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, medium-flowered, light bronze. Flowers 6 inches diameter; florets medium length, broad, overlapping, slightly pointed, slightly quilled, inner florets channelled, a colour near Tangerine Orange (H.C.C. 9/1), reverse creamy buff. Shown by Messrs. A. G. Vinten, Oldlands Nurseries, Balcombe, Sussex.

Chrysanthemum 'Confidence' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, pink. Flowers 4½ inches diameter; florets medium length, narrow, slightly overlapping, pointed, flat, Dawn Pink (H.C.C. 523/1), reverse white. Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Dennis Shoesmith' A.M. September 19, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, light bronze. Flowers 6 inches diameter; florets long, medium width, overlapping, slightly pointed, flat, outer florets Buttercup Yellow (H.C.C. 5/2), inner florets Orpiment Orange (H.C.C. 10/1), reverse Chrome Yellow (H.C.C. 605/1). Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd., Mayford Nurseries, Westfield, Woking, Surrey.

Chrysanthemum 'Dorothea' A.M. September 19, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, white. Flowers 6 inches diameter; florets medium length and breadth, overlapping, blunt, outer florets white, inner florets white with slight yellow tinge. Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Eugene' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, pink. Flowers 4 inches diameter; florets medium length and breadth, overlapping, pointed, flat, Roseine Purple

(H.C.C. 629/2), reverse Maize Yellow (H.C.C. 607/1). Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Golden Rays' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, light bronze. Flowers 6 inches diameter; florets long, medium width, overlapping, pointed, quilled, drooping, Lemon Yellow (H.C.C. 4). Raised and shown by Mr. G. Wilson, Three Trees Nursery, Prayle Grove, Cricklewood, London, N.W.2.

Chrysanthemum 'Incurved Delightful' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 20, Incurved, medium-flowered, yellow. Flowers 3½ inches diameter; florets short, broad, overlapping, blunt, Empire Yellow (H.C.C. 603/1), reverse Empire Yellow (H.C.C. 603/1) with darker colour at tips. Shown by Messrs. Zwager Bros., 201 Turkey Street, Enfield, Middlesex.

Chrysanthemum 'Jacqueline' A.M. September 19, 1957, as a variety for show purposes. Section 20, Incurved, medium-flowered, white. Flowers 4½ inches diameter; florets medium length, narrow, overlapping, pointed, quilled, outer florets white, inner florets cream, reverse white. Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Janet Amiel' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, pale pink. Flowers 6 inches diameter; florets long, medium width, overlapping, pointed, quilled, Phlox Pink (H.C.C. 625/3). Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Jean Margaret' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 22, Incurving, large-flowered, pink. Flowers 6 inches diameter; florets long, broad, overlapping, blunt, outer florets Spinel Red (H.C.C. 0023/1), inner florets Spinel Red (H.C.C. 0023), reverse Dawn Pink. (H.C.C. 523/2). Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Kenneth Whitfield' A.M. September 19, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, red. Flowers 5 inches diameter; florets long, narrow, overlapping, blunt, slightly quilled, Blood Red (H.C.C. 820), reverse Indian Yellow (H.C.C. 6/2) tinged gold. Raised by Mr C. Painter and shown by Mrs. Ada Painter, Bleak House Nurseries, 56 Upper Marehay, Ripley, Derbyshire.

Chrysanthemum 'Lilac Moon' A.M. September 19, 1957, as a variety for show purposes. Section 22, Incurving, large-flowered, pale pink. Flowers 6 inches diameter; florets long, medium width, overlapping, pointed, quilled, outer florets Fuchsine Pink (H.C.C. 627/3), inner florets Fuchsine Pink (H.C.C. 627/2), reverse Rose Pink (H.C.C. 427/3). Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Magnetic' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, medium-flowered, yellow. Flowers 6 inches diameter; florets medium length and breadth,

overlapping, slightly pointed, slightly quilled, Aureolin (H.C.C. 3). Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Margaret Meredith' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 22, Incurving, large-flowered, pink. Flowers 5 inches diameter; florets long, medium width, overlapping, pointed, Rose Bengal (H.C.C. 25/3), reverse a lighter shade of Fuchsine Pink (H.C.C. 627). Raised and shown by Samuel Meredith, Esq., 1 Victoria Place, Pinxton, Notts.

Chrysanthemum 'Mary Wilson' A.M. September 27, 1957, as a variety for show purposes. Section 20, Incurved, large-flowered, pale pink. Flowers 5½ inches diameter; florets long, medium width, overlapping, pointed, channelled, a creamy shade of Rhodamine Pink (H.C.C. 527/3). Raised and shown by Mr. G. Wilson.

Chrysanthemum 'Orange Peach Blossom' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, large-flowered, light bronze. Flowers 5 inches diameter; florets long, medium width, slightly overlapping, pointed, slightly quilled, Persimmon Orange (H.C.C. 710/3), reverse Aureolin (H.C.C. between 3/2 and 3/3) flushed pale pink. Shown by Messrs. Zwager Bros.

Chrysanthemum 'Ruby Wilson' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, large-flowered, purple. Flowers 5½ inches diameter; florets long, narrow, overlapping, pointed, flat, outer florets Rose Opal (H.C.C. 022/1), inner florets Rose Opal (H.C.C. 022), reverse Salmon (H.C.C. 412/1). Raised and shown by Mr. G. Wilson.

Chrysanthemum 'Starbrite' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, yellow. Flowers 4 inches diameter; florets long, narrow, pointed, quilled, Sulphur Yellow (H.C.C. 1). Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Starfire' A.M. August 27, 1957, as a variety for show purposes. Section 21, Reflexed, medium-flowered, red. Flowers 6 inches diameter; florets long, medium width, overlapping, pointed, quilled, a colour near Cardinal Red (H.C.C. 822), reverse gold. Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Sungold' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, yellow. Flowers 6¾ inches diameter; florets long, medium width, overlapping, quilled, tips incurving and slightly twisted, Aureolin (H.C.C. 3). Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Vista Vision' A.M. September 27, 1957, as a variety for show purposes. Section 21, Reflexed, large-flowered, red. Flowers 6 inches diameter; florets long, broad, pointed, deep rich

crimson, reverse gold tinged crimson. Raised and shown by Messrs. Rileys, Alfreton Nurseries, Woolley Moor, Derby.

Chrysanthemum 'Welbeck' A.M. September 19, 1957, as a variety for show purposes. Section 21, Reflexed, medium-flowered, bronze. Flowers 5 inches diameter; florets long, narrow, pointed, quilled, outer florets Orange (H.C.C. 12/2), inner florets Fire Red (H.C.C. 15), reverse Amber Yellow (H.C.C. 505) tinged gold. Raised and shown by Messrs. J. & T. Johnson.

Chrysanthemum 'Wilton Yellow' A.M. August 27, 1957, as a variety for show purposes and for cutting for market. Section 21, Reflexed, medium-flowered, yellow. Flowers 5¼ inches diameter; florets medium length and breadth, overlapping, slightly pointed, quilled, outer florets Aureolin (H.C.C. 3), inner florets slightly deeper shade of Aureolin (H.C.C. 3). Raised by Mr. G. F. Luckett and shown by Mr. Ron Thistlethwaite.

Chrysanthemum 'Wyvern' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 22, Incurving, medium-flowered, purple. Flowers 4½ inches diameter; florets long, medium width, overlapping, pointed, quilled, Ruby Red (H.C.C. 827/3). Raised by Mr. G. F. Luckett and shown by Mr. Ron Thistlethwaite.

Chrysanthemum 'Yellow Una' A.M. September 10, 1957, as a variety for show purposes and for cutting for market. Section 22, Incurving, large-flowered, yellow. Flowers 5 inches diameter; florets long, medium width, overlapping, blunt, quilled, Canary Yellow (H.C.C. 2). Shown by Mr. G. R. Bacon, Heathfield Nurseries, Eccleshill, Bradford, Yorks.

MID-SEASON AND LATE-FLOWERING CHRYSANTHEMUMS

Chrysanthemum 'Audrey Shoesmith' F.C.C. November 8, 1957, as a variety for show purposes. Section 1, Exhibition incurved, large-flowered, pink. Described R.H.S. JOURNAL, 82, p. 221 (A.M. 1956). Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd. (Fig. 66).

Chrysanthemum 'Aristocrat' A.M. November 8, 1957, as a variety for show purposes. Section 5, Reflexed decorative, medium-flowered, pink. Flowers 7½ inches diameter; florets long, broad, overlapping, slightly pointed, channelled, outer florets Fuchsia Purple (H.C.C. 28/3), inner florets Fuchsia Purple (H.C.C. 28/2), reverse silvery mauve. Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Glamour' A.M. November 19, 1957, as a variety for show purposes. Section 4, Medium exhibition, yellow. Flowers 8½ inches diameter; florets long, medium width, overlapping, pointed, outer florets quilled, slightly twisted, tips incurving, inner florets channelled, Empire Yellow (H.C.C. 603). Raised and shown by Messrs. H. Woolman Ltd., Shirley, Birmingham.

Chrysanthemum 'Lilac Prince' A.M. November 8, 1957, as a variety for show purposes. Section 3, Large exhibition incurving, pink. Flowers 9½ inches diameter; florets long, broad, overlapping, slightly pointed, outer florets channelled, tips incurving, inner florets quilled, tips incurving, Mallow Purple (H.C.C. 630/2), reverse paler. Raised and shown by Messrs. H. Woolman Ltd.

Chrysanthemum 'Margaret Shoesmith' A.M. November 8, 1957, as a variety for show purposes. Section 3, Large exhibition incurving, pale pink. Flowers 9½ inches diameter; florets very long, broad, overlapping, channelled, tips notched, Persian Rose (H.C.C. 628/3), reverse white. Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Mayford Supreme Improved' A.M. November 8, 1957, as a variety for show purposes. Section 6, Incurving decorative, medium-flowered, yellow. Flowers 6 inches diameter; florets long, medium width, overlapping, pointed, channelled, Lemon Yellow (H.C.C. 4), reverse Lemon Yellow (H.C.C. 4/2). Shown by Messrs. Greenyer Bros. Ltd., Broadwater Green Nurseries, Worthing, Sussex.

Chrysanthemum 'Maylen' A.M. November 8, 1957, as a variety for show purposes. Section 1, Exhibition incurved, medium-flowered, white. Flowers 5¾ inches diameter; florets long, medium width, overlapping, pointed, channelled, white. Raised by Mr. Leonard Shoesmith and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Onward' A.M. November 8, 1957, as a variety for show purposes. Section 1, Exhibition incurved, large-flowered, light bronze. Flowers 6½ inches diameter; florets medium length, broad, overlapping, blunt, channelled, reverse of floret a colour near Amber Yellow (H.C.C. 505/1), few florets visible coloured reddish bronze. Raised by Mr. H. Shoesmith, V.M.H., and shown by Messrs. H. Shoesmith Ltd.

Chrysanthemum 'Peter May' A.M. November 19, 1957, as a variety for show purposes. Section 2, Large exhibition, purple. Flowers 9½ inches diameter; florets very long, broad, overlapping, slightly quilled, channelled, slightly twisted, tips notched, outer florets Magenta Rose (H.C.C. 027), inner florets Ruby Red (H.C.C. 827/1), reverse silvery mauve. Raised and shown by Messrs. H. Woolman Ltd.

Chrysanthemum 'Primrose Jessie Habgood' A.M. October 22, 1957, as a variety for show purposes. Section 2, Large exhibition, yellow. Flowers 10½ inches diameter, florets very long, very broad, overlapping, slightly pointed, channelled, tips curling, outer florets slightly paler colour than Canary Yellow (H.C.C. 2/2), inner florets Canary Yellow (H.C.C. 2/2), reverse pale creamy yellow. Shown by Messrs. H. Woolman Ltd.

Chrysanthemum 'Red Desert Song' A.M. November 19, 1957, as a variety for show purposes. Section 9, Single, large-flowered, red. Flowers 7 inches diameter, florets very long, broad, overlapping, slightly

pointed, channelled, rich reddish bronze with slight crimson flush colour slightly paler towards centre ,disc 1½ inches diameter. Shown by Messrs. H. Woolman Ltd.

Chrysanthemum 'Rita Shirley' A.M. November 19, 1957, as a variety for show purposes. Section 4, Medium exhibition, pink. Flowers 7 inches diameter; florets long, broad, overlapping, pointed, channelled, incurved, reverse of floret a paler shade than Mallow Purple (H.C.C. 630/3), few florets visible coloured Mallow Purple (H.C.C. 630/2). Raised and shown by Messrs. H. Woolman Ltd.

Chrysanthemum 'Talisman' A.M. October 22, 1957, as a variety for show purposes. Section 4, Medium exhibition, red. Flowers 8 inches diameter; florets medium length, very broad, overlapping, slightly pointed, outer florets slightly quilled, tips incurving, inner florets channelled, deep crimson with slight purple flush, reverse gold. Raised and shown by Messrs. H. Woolman Ltd.

BOOK NOTES

"Carl Linnaeus, Species Plantarum, a Facsimile of the first edition, 1753." Volume I, with an Introduction by W. T. Stearn. 8vo. xiv + 176 [+ 14] + 560 [+ 6] pp. London, printed for the Ray Society (Bernard Quaritch), 1957. £2 10s.

The Ray Society has performed an outstanding service to all interested in the history, classification and naming of plants by publishing a facsimile of Linnaeus's *Species Plantarum*, ed. 1. This work has become a fundamental reference book for systematic botanists, and there was an urgent need for a new edition of it. Copies of the original book are almost unobtainable, and the facsimiles published at Berlin in 1907 and at Tokyo in 1934 have long since been absorbed. The frontispiece is an admirable coloured reproduction of the Wedgwood medallion portrait of Linnaeus.

The first of the two volumes, just published, includes a valuable Introduction, by Mr. W. T. Stearn, to the *Species Plantarum* and cognate botanical works, comprising nineteen closely written chapters; these deal with the life of Linnaeus, his major botanical works, the preparation of the *Species Plantarum*, and the introduction of binomial nomenclature, as well as with more technical subjects such as Linnaeus's sexual system of classification, the sources, format, method and language of the *Species Plantarum*, Pre-Linnaean literature, Linnaean herbaria, and the typification of Linnaean species.

Many Linnaean species are now divided into two or more, and the question immediately arises as to which of these should bear the Linnaean name. Here Mr. Stearn gives valuable guidance: sometimes the element for which the name should be retained is represented by a specimen in one of the herbaria consulted by Linnaeus and sometimes by a description or illustration. The complexity of the problem is illustrated by the extensive list of relevant papers cited. The Burser herbarium of more than 3,000 specimens, now at Uppsala, contains the types of many species taken by Linnaeus from Caspar Bauhin's *Pinax*. The Sloane Herbarium in the British Museum (Nat. Hist.) includes those of many species based by him on figures and descriptions published by Sloane, Catesby, Kaempfer, Petiver and Plukenet.

The chapter on geographical names is very useful. Linnaeus is said to have used an old Dutch Atlas dating from 1688: India covered both India and China, and Aethiopia meant not Abyssinia but part of South Africa near the Cape of Good Hope. The "Steniga Arabien" visited by Hasselquist was the region west of the River Jordan and the Dead Sea, and not in Arabia. Who would know the whereabouts of Lusatia, or that the Stoechades was a name for the Îles d'Hyères? Some of the signs employed by Linnaeus are puzzling to the uninitiated: an asterisk means that a good description is to be found at the place cited, and a cross indicates an imperfectly known species or

some doubt or obscurity. Signs used for sex and for duration of life were taken from the medieval symbols of the planets and metals.

Volume I of the *Species Plantarum* exists in two states: soon after the issue of some copies in May 1753 Linnaeus found it necessary to revise pp. 75, 89, 90, 259 and 260. The three leaves concerned were accordingly cut out of the copies remaining in stock, and reprinted amended leaves were carefully pasted in their place. The present facsimile is made from an exceptionally well printed copy of the second state, and the cancelled pages are reproduced on pp. 137–141 of the Introduction.

Mr. Stearn's contribution to this volume is a remarkable achievement to which full justice cannot be done in a brief review: it will endure as an indispensable textbook of Linnaeana for future generations of botanists.

T. A. SPRAGUE

"Miniature Rock Gardening in Troughs and Pans." By Royton E. Heath. Demy 8vo. 127 pp. Illus. (Collingridge.) 35*s*.

Anyone who has seen Mr. Heath's exhibits at the shows of The Alpine Garden Society will know that he is a most skilful cultivator of rock plants and that therefore what he writes must be read with respect.

By chance, I opened the book at the illustration of a "billiard table", and as this is, by no stretch of the imagination, miniature gardening, I looked at the title again and was surprised, but later, p. 25, I found that he admits that neither this nor the scree frame are miniatures and, I would add, a long bed such as that illustrated on p. 32. Apart from adding that I do not agree that small ericaceous plants "never look so happy as when grown under these conditions", i.e. on a billiard table, I will leave it at that.

True miniature gardening will appeal to those with limited space, limited leisure, or those in whom age has rusted the back muscles. In large gardens, troughs, etc., are not out of place in formal surroundings, but I suggest that they are entirely so in the rock garden proper, see p. 32.

His chapter on the construction of artificial troughs, etc., is excellent; his other chapters apply equally and adequately to any method of growing rock plants. His method of sterilizing soil is clever and unique.

I would make two comments on this section, the first, that I wish writers on gardening subjects would decide on a common name for the peat they recommend. Sorbex is merely a trade name for one brand of moss peat. Horticultural peat is not necessarily moss peat, which it is generally agreed is what rock gardeners require. I suggest "moss peat" should be the word used. On propagation, dipping pots of seeds is a wearisome job, and provided the seeds are covered with coarse grit and the pots kept in semi-darkness, there is nothing to be feared from overhead watering. Nothing is said about watering the sinks, etc., which can be burdensome in dry spells.

On p. 66 Mr. Heath makes two claims, one that *The R.H.S. Dictionary* has been used as the basis for naming the plants listed and the other that he has endeavoured to include all plants known today. His aims are excellent, so I hope he will forgive my pointing out a few errors in the former and a few omissions in the latter. *Arcterica* is still *Arcterica* not *Pieris*. In *Cyclamen* he has not followed modern nomenclature, *Fritillaria messanensis* is not a synonym of *F. latifolia nobilis*, *Muscari azureum* is *Hyacinthus*, and *Narcissus cernuus* is a synonym of *N. moschatus*, not vice-versa. *Pimelia co-arctata* appears to be unknown to any botanist and *Rhododendron repens* is now *R. forrestii*. Regarding omissions in the lists I suggest the following should have been included, even at the expense of omitting several he has mentioned: *Arctostaphylos hookeri*, *Celmisia argentea*, *Dianthus alpinus*, *D.* × *cal-alpinus*, *Erodium* species such as *corsicum*, *guttatum* and *supracanum*, *Gentiana sino-ornata*, *Soldanella villosa* and *Trachelium rumelianum*—and what about the miniature *Erica* and *Calluna* species?

Of the plants, I suggest *Pulsatilla alpina* and *P. alpina sulfurea*, the former having been omitted, are too vigorous and require too deep a rooting medium to be suitable for troughs, and that *Geranium wallichianum* and a few others are too large. I would, myself, like to know whether the author has ever made permanent a success of *Trillium undulatum* in a trough. There are numerous mis-spellings in the plant names of which I have room to mention only two or three, but there are others: *Iris melita* for *I. mellita*, *Rhodohypoxis baurei* for *R. baurii*, *Thymus saespititus* for *T. caespititus*.

Although I do not think this is a book for the beginner it contains much valuable information not only for the miniature gardener but also for the rock-plant specialist. Its great merit and the reason I recommend it, is because it is based on the author's own experience and is not a rehash of what has gone before.

E. B. ANDERSON

"Amateur Gardening Popular Encyclopaedia of Flowering Plants." By A. G. L. Hellyer, F.L.S. 8vo. 104 pp. Illus. (W. H. & L. Collingridge, London, 1957.) 15s.

In his latest work, Mr. Hellyer has described, and told us how and where to grow and propagate, over seven hundred good plants for garden and greenhouse. He has illustrated the book with more than a hundred excellent photographs and a much larger number of clear and life-like line-drawings, the latter arranged in the margins four to a page, in a very attractive manner.

In the text the plants are arranged alphabetically under what are described as their popular names, their botanical names being relegated to second place. This, the author explains, is to meet the needs of those gardeners who find botanical names troublesome. Where such established English names as hollyhock, honeysuckle and houseleek are concerned, we would not find fault with this treatment; but we wonder whether the author does his reader a real service by substituting "Climbing Leadwort" for *Plumbago capensis*, or "Falkland Island Oxalis", for *Oxalis enneaphylla*. Again, if *Primula florindae* is to become "Thibetan Primrose", what name can be found for *P. tibetica*? And why single out *Rhododendron racemosum* as the "Dwarf Chinese Rhododendron"?

This criticism apart, we have nothing but praise for a very pleasing book which contains much sound advice without padding.

N. E. GOULD

"Plant Pathology." By J. C. Walker. 707 pp. + 194 figs. 2nd Ed. (McGraw-Hill, 1957.) 75s.

Professor Walker is one of a group of plant pathologists who built up the international reputation enjoyed by the Department of Plant Pathology in the University of Wisconsin. It is therefore not surprising to find his book is one which should certainly appeal to British as well as American students. It is designed to reveal the general principles underlying the science of plant pathology rather than to provide a manual of plant diseases, and the arrangement is a familiar one to university teachers and students in this country. The bulk of the text is descriptive of diseases caused by fungi, bacteria, viruses and nematodes as well as those of non-parasitic origin. In each section certain specific diseases are described as examples, and selected literature references are given as a guide to further reading. The book also includes an interesting account of the history of plant pathology and some chapters on general subjects, such as host-parasite relations, the effect of environment on disease, and methods of control.

Most of the diseases described occur in Britain or have international significance, and the text is concise, factual and reliable. Preference is naturally given to American literature, but on the whole a reasonable balance is held, though one would have expected, for instance, to see at least some reference to English research on Apple Scab and the Brown Rot diseases of fruit. The book should be of value to English students and teachers of plant pathology as well as to research and advisory plant pathologists.

W. C. MOORE

The following books have been received:

"The Use of Home-Grown Timber in Packaging and Materials Handling." By J. R. Aaron. Forestry Commission: Forestry Record No. 35. (H.M.S.O.) 2s. 6d.

"The Polyanthus for Garden, Exhibition, and Market." By Roy Genders. 96 pp. (Foyles Handbooks.) 3s.

"Managing Southern Soils." By H. B. Vanderford. 378 pp. Illus. (Chapman & Hall.) 38s.

"Pansies and Violas." By Roy Genders. "Cold Greenhouse Crops." By A. G. Puttock. 80 pp. (Foyles Handbooks.) 3s.

ERRATUM

R.H.S. JOURNAL, Vol. 83, March 1958, p. 133: *Lilium* 'Formobel' **A.M.** 1957 was raised by Mr. L. F. La Cour at the John Innes Institution and not by Mr. J. Newell as stated.

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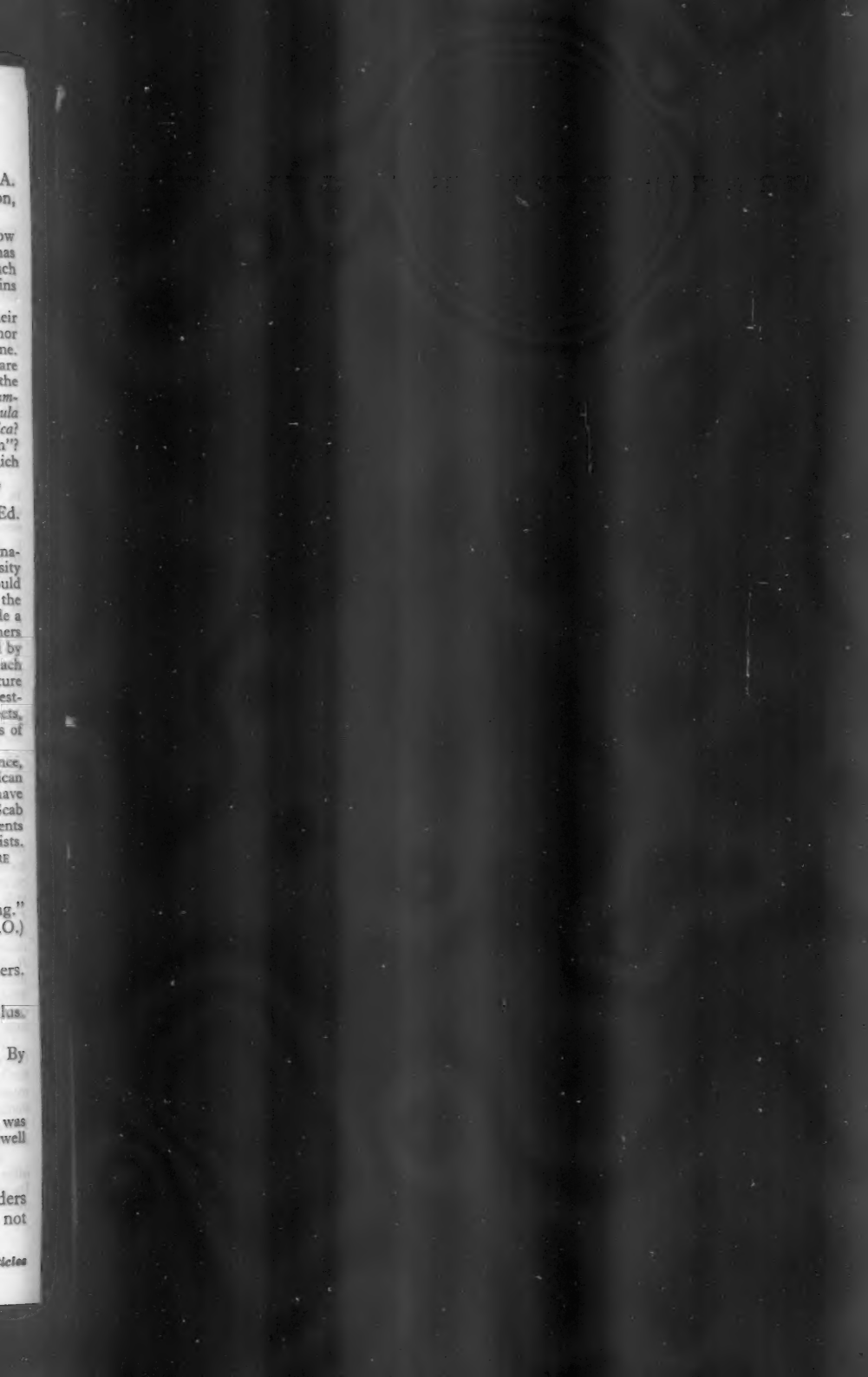

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